TEST 4

1. **A carton contains 20 bulbs, out of which 5 are defective. If a sample of 3 bulbs is selected at random, find the probability that 2 of them are defective bulbs?**

   A: 1/16 B: 3/64

   C: 9/64 D: 2/64

2. **The number of ways in which 12 balls can be divided between two friends, one receiving 8 and the other 4 is?**

   A: 12! / 8!4! B: 12!2! / 8!4!

   C: 12! / 8!4!2! D: 8!4!

3. **The probability that A can solve a problem is 2/3 and the probability that B can solve the problem is 3/4. The probability that at least one of A and B will be able to solve the problem is?**

   A: 11/12 B: 5/12

   C: 1/12 D: 1/2

4. **Suppose a biased coin comes up heads with probability 0.3 when tossed. What is the probability of achieving 1 heads after six tosses?**

   A: 0.08 B: 0.17

   C: 0.30 D: 0.44

5. **How many 5 digit number divisible by 2 can be formed from 1,2,3,5,7?**

   A: 24 B: 48

   C: 124 D: 132

6. **Out of 40 consecutive integers, two are chosen at random. The probability that their sum is odd is?**

   A: 1/200 B: 1/2

   C: 20/39 D: 1/20

7. **Cards are drawn one by one at random from a well shuffled pack of 52 cards. What is the probability that there is only one ace in first 17 cards?**

   A: $({}^{4}C_{1} * {}^{48}C_{16}) / {}^{52}C_{17}$ B: ${}^{48}C_{16} / {}^{52}C_{17}$

   C: $({}^{4}C_{1} + {}^{48}C_{16}) / {}^{52}C_{17}$ D: ${}^{4}C_{1} / {}^{52}C_{17}$

8. ***H.C.F of n !, (n + 1) ! and (n + 2) ! is?***

   A: n! B: (n+1)!

   C: (n+2)! D: None of the above.

9. **The number of arrangements which can be made using all the letters of the word LAUGH, if the vowels are adjacent is?**

   A: 120 B: 24

   C: 48 D: 56

10. **On the occasion of Eid festival, each student of a class sends greeting cards to others. If there are 20 students in the class, then the total number of greeting cards exchanged by the students is?**

    A: ${}^{20}C_{2}$ B: 2 x ${}^{20}C_{2}$

    C: 2 ${}^{20}P_{2} - 1$ D: None of the above.

11. **There are 4 letter boxes in a post office. In how many ways can a man post 8 different letters?**

    A: 4^{8} B: 8^{4}

    C: 8! D: 4!

12. 5 men and 6 women have to be seated in a straight row, so that no two women are together. Find the number of ways in which this can be done?

- A: 43200
- B: 39600
- C: 36000
- D: 86400

13. The number of ways in which 5 beads of different colours can form a necklace is?

- A: 6
- B: 12
- C: 24
- D: 60

14. L.C.M. of n !, (n + 1) ! and (n + 2) ! is?

- A: n!
- B: (n+1)!
- C: (n+2)!
- D: n

15. In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

- A: ¾
- B: 1/3
- C: 7/19
- D: 9/21

16. ${}^{n}P_{n}$ = ?

- A: ${}^{n}C_{n}$
- B: ${}^{n+1}C_{n}$
- C: n
- D: n!

17. Everybody in a room shakes hand with every other person. The total number of hand shakes is 66. Find the total number of persons in the room?

- A: 9
- B: 10
- C: 11
- D: 12

18. A problem in statistics is given to three students A, B and C whose chances of solving it are 1/2, 1/3, 1/4 respectively. What is the probability that the problem will be solved?

- A: ¼
- B: 1/24
- C: 7/24
- D: 3/4

19. The number of ways in which a mixed double game can be arranged from among nine married couples, if no husband and wife play in the same game is?

- A: 1512
- B: 756
- C: 3024
- D: 3298

20. The number of ways in which p + q things can be divided into two groups, containing p and q things respectively is?

- A: C(p + q, q)
- B: P(p + q, p)
- C: P(p + q, q)
- D: C(p + q, p - q)

21. If you toss four coins, what is the probability of getting two heads and two tails?

- A: 3/16
- B: 1/8
- C: 2/8
- D: 3/8

22. When three dice are thrown, what is the probability of getting the same number on three of them?

- A: 1/216
- B: 1/36
- C: 5/36
- D: 1/6

23. The number of digits that can be formed from 2, 3, 5, 7, 8 with 2 and 8 next to each other is?

- A: 24
- B: 36
- C: 48
- D: 72

24. An employer wants to hire 3 analysts from 6 applicants and 2 designers from 4 applicants. What is the total number of ways in which she can make the selection?

- A: 1490
- B: 132
- C: 120
- D: 60

25. If ${}^{n}C_{r-1} = 36$, ${}^{n}C_{r} = 84$ and ${}^{n}C_{r+1} = 126$, then r is equal to?

- A: 1
- B: 2
- C: 3
- D: 4

26. Four cars are racing in a circuit. What are the total number of permutations with which they can cross the finish line?

- A: 4
- B: 16
- C: 18
- D: 24

27. The probability that the 1st day of a random chosen month is a Friday is?

- A: 1/7
- B: 1/12
- C: 1/19
- D: 1/84

28. m parallel lines in a plane are intersected by a family of n parallel lines. The total number of parallelograms so formed is?

- A: (m-1)(n-1) / 4
- B: mn/4
- C: m(m-1)(n-1)/2
- D: mn(m-1)(n-1)/4

29. There are 10 girls and 20 boys in a class. 5 girls and 10 boys have blue eyes. Find the probability that one student chosen at random is a girl and has blue eyes?

- A: 2/3
- B: 5/6
- C: 1/6
- D: 1/2

30. If $P(A \cup B) \neq P(A) + P(B)$ Then;

- A: A and B are disjoint sets.
- B: A and B are Independent sets
- C: A and B are overlapping sets
- D: A and B are unit event sets.

31. From a set of 17 cards numbered 1 to 17, one card is drawn at random. The probability that the number is divisible by 3 or 7 is?

- A: 2/17
- B: 5/17
- C: 7/17
- D: 9/17

32. The number of times the digit 3 will appear listing the integers from 1 to 1000 is?

- A: 271
- B: 280
- C: 297
- D: 300

33. Three unbiased coins are tossed. What is the probability of getting atleast one head?

- A: ¾
- B: 1/4
- C: 1/8
- D: 7/8

Induction & Binomial Theorem

TEST 1

1. **Which of the following is not true regarding the binomial expansion of $(a + x)^n$?**
   - A: Total number of terms is n + 1.
   - B: Sum of exponents of a and x in each term of expansion is equal to n.
   - C: Exponent of a decrease from n to n - 1.
   - D: Exponent of x increase from 0 to n.

2. **What is the coefficient of the third term for $(x + y)^5$?**
   - A: 2
   - B: 5
   - C: 8
   - D: 10

3. **What is the general term of $(x + 2/x)^4$?**
   - A: $C(4,k)\ 2^k\ x^{4-2k}$
   - B: $C(4,k)\ 2^k\ x^{2-2k}$
   - C: $C(4,k)\ 2^k\ x^{4-k}$
   - D: $C(4,k)\ 2^{2k}\ x^{2-2k}$

4. **$(x+y)^4$ = ?**
   - A: $x^4 + 2x^3y + 4x^2y^2 + 2xy^3 + y^4$
   - B: $x^4 + 4x^3y + 6x^2y^2 + 2xy^3 + y^4$
   - C: $x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$
   - D: $x^4 + 4x^3y + 8x^2y^2 + 4xy^3 + y^4$

5. **If n is odd, the middle term in the expansion of $(a + x)^n$ is?**
   - A: n/2 + 1
   - B: n/2 and n/2 + 1
   - C: (n + 1) / 2 and (n + 2) / 2
   - D: (n + 1) / 2 and (n + 3) / 2

TEST 2

1. **The method of mathematical induction was devised by?**
   - A: David Hilbert
   - B: Francesco Mourolico
   - C: Issac Newton
   - D: Carl F. Gauss
2. **What is the 3rd term in the binomial expansion of**
3. $\left(\sqrt{\frac{a}{x}} - \sqrt{\frac{x}{a}}\right)^6$
   - A: -20
   - B: 20
   - C: 15 a/x
   - D: 15 x/a
4. **Third term in the expansion of $(1 - x)^{-1}$ is?**
   - A: x^2
   - B: $2x^2$
   - C: $-x^2$
   - D: $-2x^2$
5. **Which of the following would have even number of terms in its expansion?**
   - A: $(a + x)^{20}$
   - B: $(a + x)^{90}$
   - C: $(a + x)^{51}$
   - D: Both A and B.
6. **What is the value of $(0.97)^6$ using only the first three terms of binomial expansion?**
   - A: 0.8246
   - B: 0.8318
   - C: 0.8335
   - D: 0.8452
7. **How many terms are there in the expansion of $(a + x)^{100}$**
   - A: 99
   - B: 100
   - C: 101
   - D: Cannot determine.
8. **What is the middle term in the expansion of $(4x – y)^8$?**
   - A: 19240 x^4y^4
   - B: 17920 x^4y^4
   - C: 56220 x^2y^2
   - D: 18420 x^4y^4
9. **What is the contant term in the expansion of $(1/z^3 + z^2)^5$?**
   - A: 10
   - B: 16
   - C: 18
   - D: 24
10. **What is the fourth term in the expansion of $(1 - x)^{1/2}$?**
    - A: - ¼
    - B: - 1/2 x
    - C: -1/8 x^2
    - D: - 1/16 x^3

TEST 3

1. For which x the 5^{th} expansion member equals $M_5 = 105$?

$$\left(\frac{1}{2\sqrt{x}} - \frac{1}{2}\right)^{10}$$

- A: ½
- B: 1/4
- C: 1/8
- D: 2

2. **If x is the sum of the odd coefficients and y is the sum of the even coefficients in a binomial expansion. Then?**
   - A: x = y/2
   - B: x = y
   - C: x = 2y
   - D: None of the above.

3. **The rule of binomial expansion for $(a + x)^n$ is valid if?**
   - A: a and x both are real numbers.
   - B: a is real and x can be real or complex.
   - C: x is real and a can be real or complex.
   - D: Both a and x can be real or complex.

4. **Find out the member of the binomial expansion of $(x + x^{-1})^8$ not containing x?**
   - A: 7^{th}
   - B: 6th
   - C: 5^{th}
   - D: 4th

5. **If in the expansion of $(x + y^3)^n$ the coefficient of the 3^{rd} term is greater by 44 than the 2^{nd} term. The value of n is?**
   - A: 8
   - B: 9
   - C: 10
   - D: 11

6. **Which term in the expansion of $(x - 2/x^2)^{13}$ has term x^{-2} ?**
   - A: 5^{th}
   - B: 6th
   - C: 7^{th}
   - D: 8th

7. **The sum of coefficients in the binomial expansion is equal to?**
   - A: 2^n
   - B: 2^{2n}
   - C: 2^{2n-1}
   - D: 2^{n-1}

8. **What is the middle term in the expansion of $(x + 1/x)^{2n}$? Where $x \neq 0$.**
   - A: C(2n,n)
   - B: C(2n,n) x
   - C: C(2n,n) x^{2n}
   - D: C(2n,n) x^{3n}

9. **What is the constant term in the expansion of $(x^2 - 2/x^2)^8$?**
   - A: 1080
   - B: 1120
   - C: 2400
   - D: 2480

10. **Which member of the binomial expansion of $(2x^3 + x^{-1})^{10}$contains x^6?**
    - A: 6^{th}
    - B: 7^{th}
    - C: 8^{th}
    - D: 9th

11. **What is the term containing x^{14} in the expansion of $(x^3 - 1/x^2)^{13}$?**
    - A: C(13,7) $12x^{14}$
    - B: -C(13,6) $10x^{14}$
    - C: -C(13,5) x^{14}
    - D: C(13,8) $4x^{14}$

Trigonometry

TEST 1

1. **235^o expressed in radians is?**
   - A: $\pi / 235$
   - B: $85\pi / 49$
   - C: $47\pi / 36$
   - D: $235/\pi$

2. **1/2 rotation anti-clockwise is called?**
   - A: Right angle
   - B: Straight Angle
   - C: Circle
   - D: None of the above.

3. If $5\sin\theta = 3$, $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta}$ is equal to
   - A: ½
   - B: 1
   - C: 2
   - D: 4

4. **If $\cos 3\theta = \sqrt{3}/2$; $0 < \theta < 20^o$ then the value of θ is?**
   - A: 0^o
   - B: 5^o
   - C: 10^o
   - D: 15^o

5. **If $\sec\theta - \tan\theta = 1/2$ then $\sec\theta + \tan\theta = ?$**
   - A: 1
   - B: 2
   - C: 3
   - D: 4

6. **cos A - cos B = ?**
   - A: 2 cos (A+B)/2 cos (A-B)/2
   - B: 2 cos (A+B)/2 sin (A-B)/2
   - C: 2 sin (A+B)/2 cos (A-B)/2
   - D: -2 sin (A+B)/2 sin (A-B)/2

7. **Which of the following is not ture?**
   - A: cot (-θ) = - cot θ
   - B: cos (-θ) = cos θ
   - C: sin (-θ) = - sin θ
   - D: tan (-θ) = tan (θ)

8. **sin 30^0 + cos 60^0 + tan 45^0 is equal to?**
   - A: 1
   - B: 2
   - C: 3
   - D: 4

9. **In sexagesimal system angle is represented in?**
   - A: Degrees
   - B: Degrees, Minutes and Seconds
   - C: Radians
   - D: Mircro radians.

10. **If sin θ = cos θ then θ = ?**
    - A: 30^o
    - B: 45^o
    - C: 60^o
    - D: 75^o

11. **If the length of arc is twice the radius of the circle. Then angle subtended at the center is?**
    - A: 1 radian
    - B: 2 radian
    - C: π/3 radian
    - D: π/4 radian

12. What is the period of tan 4x?

- A: π
- B: π/3
- C: π/4
- D: π/8

13. $\tan^2 x - \sin^2 x$ is equal to?

- A: $\tan^2 x \cdot \operatorname{cosec}^2 x$
- B: $\sin^2 x \cdot \cot^2 x$
- C: $\sec^2 x \cdot \operatorname{cosec}^2 x$
- D: $\tan^2 x \cdot \sin^2 x$

14. $\tan 225^o$ =?

- A: 0
- B: 1
- C: √3
- D: 1/√3

15. tan (2π - θ) = ?

- A: tan θ
- B: - tan θ
- C: cot θ
- D: - cot θ

16. If cos A = 1/√2 and sin B = 1/2 then A+B = ?

- A: 60^o
- B: 75^o
- C: 90^o
- D: 120^o

17. 1^o = ?

- A: 0.0125 radian
- B: 0.0175 radian
- C: 0.0225 radian
- D: 0.0275 radian

18. 35^o 20' in radians is?

- A: 28π / 220
- B: 53π / 45
- C: 53π / 290
- D: 53π / 270

19. cos (π + θ) = ?

- A: sin θ
- B: - sin θ
- C: cos θ
- D: - cos θ

20. If A = B = 60^o. Then $\frac{cscA + cotB}{secA * tanB}$ = ?

- A: 0
- B: 1
- C: ½
- D: 1/√2

TEST 2

1. Which of the following relations is possible?

- A: sec θ = 2/3
- B: sin θ = 4/3
- C: tan θ = 2014
- D: cos θ = $(1+t^2) / (1-t^2)$

2. sec (-960^o) = ?

- A: 2
- B: √2
- C: -√2
- D: -2

3. cos 2α = ?

- A: sin α cos α
- B: 2 sin α cos α
- C: $\cos^2 \alpha - \sin^2 \alpha$
- D: $\cos^2 \alpha + \sin^2 \alpha$

4. **If α, β and γ are the angles of a triangle then $\sin(\alpha + \beta) = ?$**

   A: $\sin\gamma$ B: $\cos\gamma$

   C: $-\sin\gamma$ D: $-\cos\gamma$

5. **$\sin(-625^o) = ?$**

   A: $\sin 5^o$ B: $\cos 5^o$

   C: $\sin 15^o$ D: $\cos 15^o$

6. **Converting 21.256^o to DMS gives?**

   A: 21^o 15.36' B: 21^o 18' 32"

   C: 21^o 15' 22" D: 21^o 15' 28"

7. **If $\sin(A + B + C) = 1$, $\tan(A - B) = 1/\sqrt{3}$, and $\sec(A + C) = 2$, then?**

   A: $A = 120^o$, $B = 60^o$ and $C = 0^o$ B: $A = 60^o$, $B = 30^o$ and $C = 0^o$

   C: $A = 60^o$, $B = 60^o$ and $C = 60^o$ D: $A = 90^o$, $B = 60^o$ and $C = 30^o$

8. **$\sin A + \sin B = ?$**

   A: $-2\sin\frac{(A+B)}{2}\sin\frac{(A-B)}{2}$ B: $2\cos\frac{(A+B)}{2}\cos\frac{(A-B)}{2}$

   C: $2\sin\frac{(A+B)}{2}\cos\frac{(A-B)}{2}$ D: $2\cos\frac{(A+B)}{2}\sin\frac{(A-B)}{2}$

9. **The value of $\tan 15^o + \cot 15^o$ is ?**

   A: 1 B: $\sqrt{3}$

   C: $\sqrt{3}/2$ D: 4

10. **The period of the function $f(x) = \cos 4x$ is?**

    A: π B: 2π

    C: $\pi/2$ D: $3\pi/2$

11. **If $x = \sin^2\theta\cos\theta$ and $y = \cos^2\theta\sin\theta$ then $\sin\theta = ?$**

    A: x^2 / y B: y^2 / x

    C: $(y^2 / x)^{1/3}$ D: $(x^2 / y)^{1/3}$

12. **What is the period of $\cot x/7$?**

    A: 7π B: $2\pi/7$

    C: $\pi/7$ D: $\pi/14$

13. **If $\cot\theta = \sin 2\theta$, then θ is equal to?**

    A: 45^o and 90^o B: 45^o and 90^o

    C: 90^o and 60^o D: 60^o and 30^o

14. **The value of $\cos^2 15° - \cos^2 30° + \cos^2 45° - \cos^2 60° + \cos^2 75°$ is?**

    A: 1 B: 1/2

    C: 3/2 D: 2

15. **If $\tan\theta = 8/15$ then what is the value of $\sec\theta$ for θ lying in the quadrant III?**

    A: 15/17 B: -15/17

    C: 17/15 D: - 17/15

16. **The largest value of $\sin\theta \times \cos\theta$ is?**

    A: 1 B: 1/2

    C: $1/\sqrt{2}$ D: $1/\sqrt{3}$

17. (1 + sec θ) (1 - cos θ) = ?

- A: sin θ
- B: cot θ
- C: cot θ cos θ
- D: tan θ sin θ

18. sec (-7π/4) = ?

- A: √2
- B: -√2
- C: 2/√3
- D: - 2/√3

19. If the length of a chord of a circle is equal to the radius of that circle, the angle subtended (in radians) at the centre of the circle by the chord is?

- A: 1
- B: π/2
- C: π/3
- D: π/6

20. The value of cos1° * cos2° * cos3° ..... cos179° is ?

- A: 0
- B: 1
- C: 2
- D: -1

TEST 3

1. The perimeter of a certain sector of a circle is equal to half that of the circle of which it is a part. The circular measure of the angle of the sector is?

- A: π
- B: π - 2
- C: 2π/3
- D: π - 4

2. tan 3x - tan 2x - tan x is equal to?

- A: tan x / (tan 2x * tan 3x)
- B: $(\tan x)^3$
- C: (tan 3x + tan 2x + tan x) - (tan x * tan 2x)
- D: tan x * tan 2x * tan 3x

3. sin 75^o = ?

- A: $\frac{\sqrt{2}(\sqrt{3}+1)}{4}$
- B: $\frac{\sqrt{2}(\sqrt{3}-1)}{4}$
- C: √3/4
- D: -√3/4

4. The equation sin x cos x = 2 has?

- A: One solution
- B: Two solutions
- C: Infinite solutions.
- D: No solution.

5. cos (x+y) sin (x-y) = ?

- A: 1/2 (sin 2x - sin 2y)
- B: 1/2 (sin 2y - sin 2x)
- C: sin 2x - sin 2y
- D: sin 2x + sin 2y

6. tan (294^o) = ?

- A: cot 32^o
- B: - cot 32^o
- C: - cot 24^o
- D: cot 24^o

7. If sin A + sin B = x and cos A + cos B = y, cos(A - B) is equal to ?

- A: $x^2 + y^2 - 2$
- B: $(x^2 + y^2 - 2) / 2$
- C: $(2 - x^2 + y^2) / 2$
- D: $(2 - x^2 - y^2) / 2$

8. Period of cot (3x) - sin (4x) is?

- A: πq
- B: π/2
- C: π/3
- D: π/4

9. $\frac{sin\,3\theta}{sin\,\theta} - \frac{cos\,3\theta}{cos\,\theta} = ?$

- A: 1
- B: 2
- C: tan 2θ
- D: cot 2θ

10. (1 - cos α) / sin α = ?

- A: cos α/2
- B: sin α/2
- C: sec α/2
- D: tan α/2

11. 8 sin x/8 cos x/2 cos x/4 cos x/8 = ?

- A: 4 sin x
- B: sin x
- C: cos x
- D: 8 cos x

12. What is the domain of $\sqrt{sin^{-1}2x + \pi/6}$ **?**

- A: [1/4 , 1/2]
- B: [-1/4 , 1/2]
- C: [1/8 , 1/2]
- D: [-1/8 , 1/2]

13. cos 12^o + cos 48^o = ?

- A: 2 cos 30^o cos 18^o
- B: - 2 cos 30^o cos 18^o
- C: 2 cos 30^o sin 18^o
- D: - 2 cos 30^o sin 18^o

14. If (x $\sin^3$ α + y $\cos^3$ α) = sin α cos α and (x sin α - y cos α = 0), then $x^2 + y^2$ = ?

- A: 0
- B: 2
- C: -1
- D: 1

15. If $\sin^2\theta$ + 3 cosθ - 2 = 0, $\cos^3\theta$ + $\sec^3\theta$ is equal to?

- A: 18
- B: 9
- C: 6
- D: 3

16. The value of tan 1^o * tan 2^o * tan 3^o ..... tan 89^o = ?

- A: 0
- B: 1
- C: -1
- D: 1/2

17. If cos (A - B) = 3/5 and tan A . tan B = 2 then ?

- A: cos A cos B = 1/5
- B: sin A sin B = -2/5
- C: cos (A + B) = 1/5
- D: sin A sin B =4/5

18. sin 2α / (1 + cos 2α) = ?

- A: cot α
- B: tan α
- C: sec α
- D: csc α

19. Find the value of $\frac{\sin 3\theta + \sin 5\theta + \sin 7\theta + \sin 9\theta}{\cos 3\theta + \cos 5\theta + \cos 7\theta + \cos 9\theta}$

- A: tan 3θ
- B: cot 3θ
- C: tan 6θ
- D: cot 6θ

20. $\frac{tan\ \alpha + tan\ \beta}{tan\ \alpha - tan\ \beta} = ?$

- A: sin (α + β) / sin (α - β)
- B: sin (α - β) / sin (α + β)
- C: cot (α + β)
- D: sin α / sin (α - β)

TEST 4

1. tan (15^o) = ?

- A: (√3 + 1) / (√3 - 1)
- B: (√3 - 1) / (√3 + 1)
- C: √3 / (√3 + 1)
- D: 1/3√3

2. The bottom of a pendulum describes an arc 3 ft long when the pendulum swings through an angle of 1/5 radian. The length of the pendulum in feet is ?

- A: 15 ft
- B: 12 ft
- C: 5/3 ft
- D: 3/5 ft

3. tan (π/4 + θ) tan (3π/4 + θ) is equal to ?

- A: 0
- B: 1
- C: -1
- D: 2

4. If tan 2 A = cot (A - 18^o), then the value of A is?

- A: 18^o
- B: 24^o
- C: 27^o
- D: 36^o

5. What is the period of sec 9x ?

- A: π
- B: 2π/9
- C: π/9
- D: π/18

6. If cot θ > 0 and sin θ < 0 then θ lies in the ?

- A: Quadrant I
- B: Quadrant II
- C: Quadrant III
- D: Quadrant IV

7. If α, β and γ are the angles of a triangle then tan (α + β) - tan γ = ?

- A: 2 tan γ
- B: - 2 tan γ
- C: 0
- D: 1

8. 1 radian = ?

- A: 60^o
- B: 59^o
- C: 58^o
- D: 57^o

9. 6'' in radians = ?

- A: π / 216000 radians
- B: π / 108000 radians
- C: π / 648000 radians
- D: π / 3600 radians

10. The radius of a circle is 8 in. Find the angle in radians that an arc of 1 ft subtends in the center of this circle?

- A: 1/8
- B: 2/8
- C: 3/2
- D: π/6

11. In a triangle ABC, A = 45°, then the value of (1 + cot B) (1 + cot C) is equal to ?

- A: 0
- B: 1
- C: -1
- D: 2

12. If tan θ = - 4/3, sin θ = ?

- A: -4/5 but not 4/5
- B: 4/5 but not -4/5
- C: 4/5 or - 4/5
- D: Undefined.

13. Which of the following is true for $0^o \leq \theta < 90^o$?

- A: 1/sec θ > 1
- B: 1/cosec θ < 1
- C: sec θ = 0
- D: 1/cos θ < 1

14. Which of the following is true about θ in the quadrant II?

csc θ is positive, cos θ is positive, tan θ is positive

- A: i only
- B: i and ii only
- C: ii and iii only
- D: None of them is true

15. Domain of csc θ is θ Є R except θ = ?

- A: nπ where n Є Z
- B: [(2n+1)/2] π where n Є Z
- C: nπ/2 where n Є Z
- D: (2n+1/2)π where n Є Z

16. If sec θ + tan θ = x then tan θ = ?

- A: $(x^2 - 1) / x$
- B: $(x^2 + 1) / x$
- C: $(x^2 + 1) / 2x$
- D: $(x^2 - 1) / 2x$

17. Which of the following is not possible?

- A: sin θ = ¾
- B: tan θ = 75
- C: cosec θ = 5/3
- D: cos θ = $(1 + t^2) / (1 - t^2)$

18. The value of $\sin^2 \pi/8 + \sin^2 3\pi/8 + \sin^2 5\pi/8 + \sin^2 7\pi/8$ is?

- A: -1
- B: 0
- C: 1
- D: 2

19. If tan A = 1/2, then tan 2A is equal to?

- A: 1
- B: 1/2
- C: 4/3
- D: 5/4

20. If A = B = C = 60^o then $\frac{tanA + tanB + tanC}{tanA * tanB * tanC}$ = ?

- A: 0
- B: 1
- C: -1
- D: √3

Inverse Trigonometric Function

TEST 1

1. Which of the following is true?

$\sin^{-1} x = (\sin x)^{-1}$, $\cos^{-1} x = (\cos x)^{-1}$, $\tan^{-1} x = (\cot x)^{-1}$

- A: i and ii only
- B: ii only
- C: i, ii and iii
- D: None of them is true.

2. $\cos^{-1} A + \cos^{-1} B$ = ?

- A: $cos^{-1}(AB - \sqrt{(1 + A^2)(1 + B^2)})$
- B: $cos^{-1}(AB + \sqrt{(1 - A^2)(1 - B^2)})$
- C: $cos^{-1}(AB - \sqrt{(1 - A^2)(1 - B^2)})$
- D: $cos^{-1}(AB + \sqrt{(1 + A^2)(1 + B^2)})$

3. Principal value of $\sin^{-1}(-\sqrt{3}/2)$ = ?

- A: $-2\pi/3$
- B: $-\pi/3$
- C: $\pi/3$
- D: $2\pi/3$

4. Range of $y = \sin^{-1} x$ is?

- A: $-\pi/2 \le y \le \pi/2$
- B: $-\pi \le y \le \pi$
- C: $-\pi/4 \le y \le \pi/4$
- D: $-1 \le y \le 1$

The value of $\tan^{-1}(-1/\sqrt{3})$ is?

- A: $\pi/3$
- B: $-\pi/4$
- C: $3\pi/4$
- D: $-\pi/6$

5. What is the value of $\tan^{-1} 3/4 + \tan^{-1} 5/12$?

- A: $\tan^{-1} 56/33$
- B: $\tan^{-1} 16/33$
- C: $\tan^{-1} 15/48$
- D: $\tan^{-1} 16/63$

6. y = tan x is called principal tangent function if ?

- A: - infinity < x < infinity
- B: $-\pi < x < \pi$
- C: $-\pi/2 < x < \pi/2$
- D: $0 < x < \pi$

7. $\cos^{-1}(-1/2)$ = ?

- A: $\pi/3$
- B: $-2\pi/3$
- C: $2\pi/3$
- D: Both B and C.

8. Range of $y = \cos^{-1} x$ is?

- A: $-\pi/2 \le y \le \pi/2$
- B: $-\pi \le y \le \pi$
- C: $0 \le y \le \pi/2$
- D: $0 \le y \le \pi$

9. $2 \tan^{-1} A$ = ?

- A: $\tan^{-1} 2A / (1 + A^2)$
- B: $\tan^{-1} 2A / (1 - A^2)$
- C: $\tan^{-1} A / (1 + A^2)$
- D: $\tan^{-1} A / (1 - A^2)$

10. $\cos(\cos^{-1} 1/5)$ = ?

- A: 1
- B: 5
- C: 1/5
- D: 4/5

11. cos ($\sin^{-1} 1/\sqrt{2}$) = ?

- A: $1/\sqrt{2}$
- B: $\sqrt{2}/3$
- C: $2/\sqrt{3}$
- D: $1/2$

12. $\cos^{-1}$ A - $\cos^{-1}$ B = ?

- A: $cos^{-1}(AB - \sqrt{(1-A^2)(1-B^2)})$
- B: $cos^{-1}(AB + \sqrt{(1-A^2)(1-B^2)})$
- C: $cos^{-1}(AB + \sqrt{(1+A^2)(1+B^2)})$
- D: $cos^{-1}(AB - \sqrt{(1+A^2)(1+B^2)})$

13. Which of the following function has domain ranging from - infinity to + infinity ?

- A: $y = \sin^{-1} x$
- B: $y = \sec^{-1} x$
- C: $y = \cos^{-1} x$
- D: $y = \tan^{-1} x$

TEST 2

1. The value of sec $\left[\tan^{-1}\left(\frac{b+a}{b-a}\right) - \tan^{-1}\left(\frac{a}{b}\right)\right]$ is

- A: $\sqrt{3}/2$
- B: $\sqrt{2}$
- C: 1
- D: $1/\sqrt{3}$

2. If $y = \sin^{-1} x$ then cos ($\sin^{-1} x$) = ?

- A: $(1-x)^{1/2}$
- B: $(1-x)^{1/2}$
- C: $(1-x^2)^{1/2}$
- D: $(1+x^2)^{1/2}$

3. cos [$\tan^{-1}$ 1/3 + $\tan^{-1}$ 1/2] = ?

- A: $1/\sqrt{2}$
- B: $\sqrt{2}$
- C: $\sqrt{3}/2$
- D: 1/2

4. $\cot^{-1}$ (-1) = ?

- A: 1
- B: $\pi/2$
- C: $2\pi/3$
- D: $3\pi/4$

5. Principal value of $\sin^{-1}$ (sin $3\pi/5$) = ?

- A: $3\pi/5$
- B: $4\pi/5$
- C: $2\pi/5$
- D: $\pi/5$

6. What is the principal value of $\cot^{-1}$ ($-1/\sqrt{3}$) ?

- A: $3\pi/2$
- B: $\pi/3$
- C: $\pi/6$
- D: $2\pi/3$

7. $\sin^{-1}$ 3/5 + $\sin^{-1}$ 8/17 = ?

- A: $\sin^{-1}$ (11 / 23)
- B: $\sin^{-1}$ (19 / 76)
- C: $\sin^{-1}$ (63 / 95)
- D: $\sin^{-1}$ (77 / 85)

8. Which of the following is Domain and Range of $y = \cot^{-1} x$?

- A: Domain: $-\infty < x < \infty$ Range: $-\pi/2 < y < \pi/2$
- B: Domain: $-1 < x < 1$ Range: $-\pi/2 < y < \pi/2$
- C: Domain: $-\infty < x < \infty$ Range: $-\pi < y < \pi$
- D: Domain: $-\infty < x < \infty$ Range: $0 < y < \pi$

9. Principal value of $\sin^{-1}[\sin(2\pi/3)] = ?$

- A: $2\pi/3$
- B: $-2\pi/3$
- C: $\pi/3$
- D: $\pi/6$

10. $\cos(\sin^{-1} 3/5) = ?$

- A: 3/5
- B: 1/3
- C: 4/5
- D: $2/\sqrt{3}$

11. Range of $y = \tan^{-1} x$ is ?

- A: $-\pi/2 < y < \pi/2$
- B: $-\pi/2 \leq y \leq \pi/2$
- C: $0 \leq y \leq 2\pi$
- D: $0 < y < 2\pi$

12. $tan^{-1}\dfrac{a-b}{1+ab} + tan^{-1}\dfrac{b-c}{1+bc} = ?$

- A: $\tan^{-1} a - \tan^{-1} c$
- B: $\tan^{-1} a - \tan^{-1} b$
- C: $\tan^{-1} b - \tan^{-1} c$
- D: $\tan^{-1} c - \tan^{-1} a$

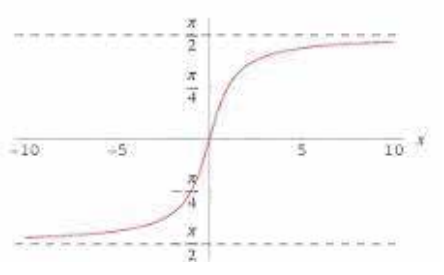
13. If $\alpha = 2\cos^{-1} 4/5$ then $\sin\alpha = ?$

- A: 3/5
- B: 24/25
- C: 4/5
- D: 30/25

14. $sin^{-1}(2x\sqrt{1-x^2}) = ?$

- A: $\sin^{-1} x$
- B: $2\sin^{-1} x$
- C: $3\sin^{-1} x$
- D: $4\sin^{-1} x$

15. The graph below is for which function?



- A: $y = \sin^{-1} x$
- B: $y = \cos^{-1} x$
- C: $y = \tan^{-1} x$
- D: $y = \cot^{-1} x$

16. If $\tan^{-1}(1 + x) + \tan^{1}(1 - x) = \pi/2$ then $x = ?$

- A: 0
- B: 1
- C: -1
- D: $\sqrt{3}$

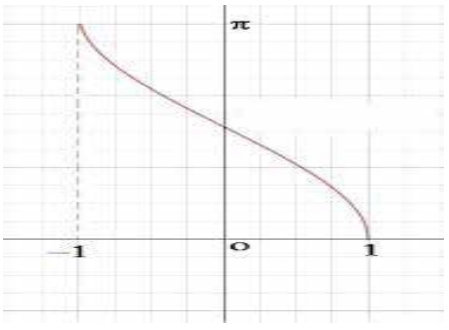
17. y = sec x is called a principal secant function if?

- A: $-\pi \leq x \leq \pi$ and $x \neq \pi/2$ or $-\pi/2$
- B: $-\pi/2 < x < \pi/2$
- C: $0 \leq x \leq \pi$ and $x \neq \pi/2$
- D: $0 \leq x < \pi/2$

18. If $\alpha = \sin^{-1} 5/13$, then $\cos\alpha = ?$

- A: 8/13
- B: 7/13
- C: 11/13
- D: 12/13

19. The graph below is for which function?



- A: $\sin^{-1} x$
- B: $\cos^{-1} x$
- C: $\tan^{-1} x$
- D: $\cot^{-1} x$

20. $\text{cosec}^{-1}(-2/\sqrt{3}) = ?$

- A: $\pi/3$
- B: $-\pi/3$
- C: $4\pi/3$
- D: $-4\pi/3$

TEST 3

1. $\sin(\sin^{-1} 1/5 + \cos^{-1} x) = 1$ then x = ?

- A: 2/5
- B: 1/3
- C: 1/5
- D: 1/2

2. $\sin(2\cos^{-1} x) = ?$

- A: $2x\sqrt{1-x^2}$
- B: $2x\sqrt{1-x}$
- C: $\dfrac{2x}{\sqrt{1-x^2}}$
- D: $\dfrac{2x}{\sqrt{1+x^2}}$

3. Domain and range of $y = \csc^{-1} x$ is ?

- A: Domain : $-\infty < x < \infty$ Range : $-\pi/2 \le y \le \pi/2$
- B: Domain : $-1 \le x \le 1$ Range : $-\pi/2 \le y \le \pi/2$ and $y \ne 0$
- C: Domain : $1 \le |x|$ Range : $-\pi/2 \le y \le \pi/2$ and $y \ne 0$
- D: Domain : $1 > |x|$ Range : $-\pi/2 \le y \le \pi/2$ and $y \ne 0$

4. $\sin(\cos^{-1} -2/3) = ?$

- A: $1/\sqrt{2}$
- B: $\sqrt{5}/3$
- C: $1/\sqrt{3}$
- D: $\sqrt{3}$

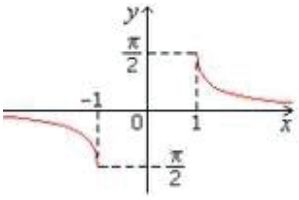
5. If $\tan^{-1} 2x + \tan^{-1} 3x = \pi/4$, what is the value of x?

- A: 1/6
- B: -1
- C: -1 and 1/6
- D: 1

6. $\cos^{-1}(\cos 7\pi/6) = ?$

- A: $7\pi/6$
- B: $\pi/6$
- C: $5\pi/6$
- D: $\pi/3$

7. The graph below is for which function?



- A: $y = \tan^{-1} x$
- B: $y = \cot^{-1} x$
- C: $y = \sec^{-1} x$
- D: $y = \csc^{-1} x$

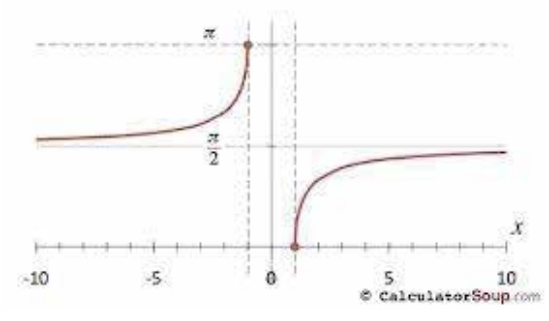
8. If $\sin^{-1} x + \sin^{-1} y = 2\pi/3$, then $\cos^{-1} x + \cos^{-1} y$ is equal to ?

- A: $2\pi/3$
- B: $3\pi/2$
- C: $\pi/5$
- D: $\pi/3$

9. $\tan^{-1} (-x) = ?$

- A: $\tan^{-1} (x)$
- B: $- \tan^{-1} (x)$
- C: $- \cot^{-1} (x)$
- D: $\cot^{-1} (x)$

10. The graph below is for which function?



- A: $y = \tan^{-1} x$
- B: $y = \cot^{-1} x$
- C: $y = \csc^{-1} x$
- D: $y = \sec^{-1} x$

11. $\tan (\sin^{-1} x) = ?$

- A: $x / (1-x^2)$
- B: $x / (1-x)$
- C: $\frac{x}{\sqrt{1+x^2}}$
- D: $\frac{x}{\sqrt{1-x^2}}$

12. $\sin\left[\frac{\pi}{2} - \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right] =$

- A: $\sqrt{3}/2$
- B: $-\sqrt{3}/2$
- C: ½
- D: - 1/2

13. The value of $\tan (\cos^{-1}(4/5) + \tan^{-1} (2/3))$ is equal to ?

- A: 7/5
- B: 17/6
- C: 17/18
- D: Cannot be determined.

14. The value of $\tan^{-1}1 + \tan^{-1} 2 + \tan^{-1} 3$ is ?

- A: $\pi/2$
- B: -1
- C: 1
- D: 0

15. tan ($\sin^{-1}$ -3/4) = ?

- A: 3/√5
- B: -3/√5
- C: 3/√7
- D: -3/√7

16. Value of cos ($\tan^{-1}$ 15/8 - $\sin^{-1}$ 7/25) = ?

- A: 114/350
- B: 297/425
- C: 215/345
- D: 138/147

17. The product of the roots of the equation $\tan^{-1}(2x) + \tan^{-1}(3x) = 3\pi/4$ is ?

- A: -1/6
- B: -1/2
- C: 1
- D: 3

Function And Limits

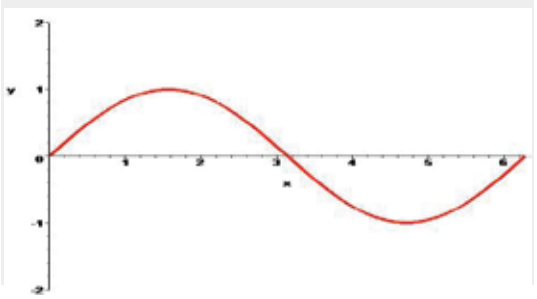
TEST 1

1. **If f(x,y,z)=2x+3y-z and f(a,b,0)=f(0,a,b), then b / a equals**
   - A: 0
   - B: 2
   - C: ½
   - D: 1/4
2. **Range of the function $f(x) = \sqrt{36 - x^2}$ is**
   - A: $[0, -\infty]$
   - B: $[\infty, -\infty]$
   - C: $[0, 6]$
   - D: $[36, 1]$
3. **If $f(x) = 3x^2 - 2x + 4$, f(-2) =**
   - A: -2
   - B: 20
   - C: 4
   - D: 12
4. **If $g(x) = x^3 - x^2 - x - 1$, then the value of g(-1) is:**
   - A: 0
   - B: 1
   - C: -2
   - D: 2
5. **Let $f(x) = 3x^2 + 4$, g(x) = 2 and h={(1,2),(2,1),(3,2)}.**
   - A: f(x) is the only function.
   - B: f(x) and g(x) are the only functions.
   - C: f(x), g(x) and h(x) are all functions.
   - D: None of these are functions.
6. **If f(x)=3 and g(x)=2, then f(g(x))=**
   - A: 2
   - B: 3
   - C: 6
   - D: 5
7. **Range of the function $f(x) = 2x - 3$ is**
   - A: $(-\infty, +\infty)$
   - B: [2,3]
   - C: [2,10]
   - D: None of the above.

8. **If f(x)=2x+3 and g(x) = x^2 - 1, then f(g(2))=**

- A: 4
- B: 9
- C: 13
- D: 19

9. **The following figure shows a graph of which type of function?**



- A: Sine
- B: Cosine
- C: Tangent
- D: Log

10. **If p(x)=4x-6 and p(a)=0, then a=**

- A: 3
- B: 2
- C: 3/2
- D: 2/3

11. **If f(x)=x and g(x)=x.f(x), then f(x) / g(x) =**

- A: x
- B: 1/x
- C: 1
- D: None of the above.

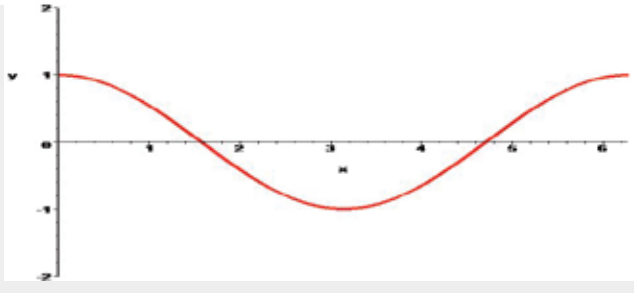
12. **If $f(x) = x^7 - 97x^6 - 199x^5 + 99x^4 + 2x + 195, f(-1)$ equals:**

- A: 24
- B: 154
- C: 272
- D: 393

13. **What value(s) must be excluded for the domain of f={(x,y):y=$\frac{x+2}{x-2}$}?**

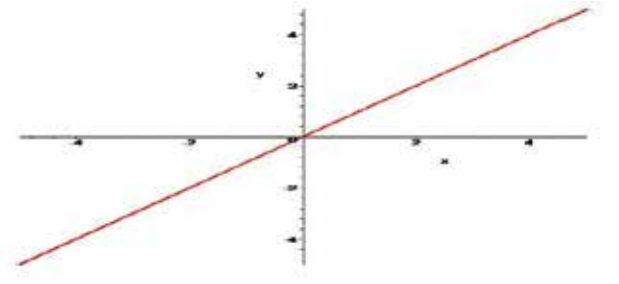
- A: 2
- B: -2
- C: 0
- D: 2 and -2

14. **The following figure shows a graph of which type of function?**



- A: Sine
- B: Cosine
- C: Tangent
- D: Log

15. The following figure shows a graph of which type of function?



- A: Linear Function
- B: Even Degree Polynomial
- C: Odd Degree Polynomial
- D: None of the Above

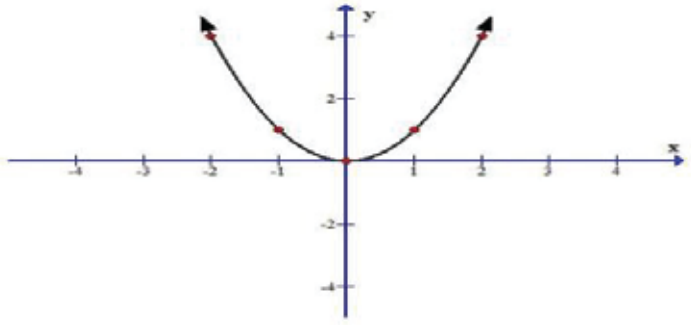
16. If f(1) = 1 and f(2) = 2 and f(-1) = -1, then f(x) would be:

- A: 0
- B: 1
- C: 2
- D: x

17. If $f(r,\theta) = r\cos\theta, f(2,\frac{\pi}{3}) =$

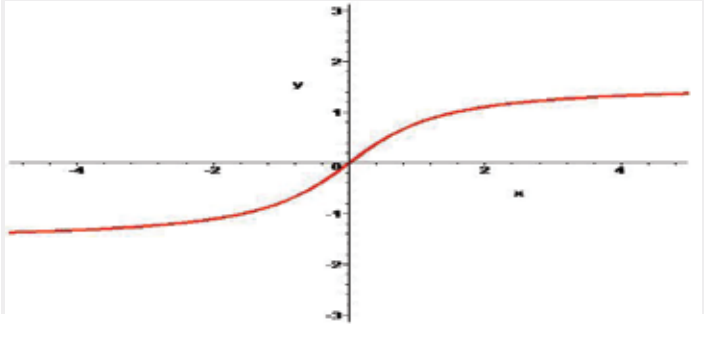
- A: 2π
- B: 1
- C: $\frac{\pi}{6}$
- D: $\frac{1}{2}$

18. Which of the following functions represents the plot shown?



- A: $f(x) = x^2$
- B: $f(x) = x^2 - x - 5$
- C: $f(x) = x^3$
- D: None of the above.

19. The following figure shows a graph of which type of function?



- A: Cosecant
- B: Secant
- C: Cotangent
- D: Arctangent

20. If $f(x, y, z) = x^2 + y^2 - 2z$ for all real numbers x, y and z, then f(-1,-1,-1)=

- A: 0
- B: 2
- C: 4
- D: 6

TEST 2

1. **If f(x,y)=3x+2y-8 and g(z) = z^2 for all real numbers x,y,z then f(3,g(4))=**

   A: 15 B: 33

   C: 45 D: 25

2. **For a function to be even as well as odd, it must be:**

   A: Symmetric about origin (by 180^0) B: Symmetric about y-axis (by 180^0)

   C: Both A and B D: None of the above

3. **If g(x)=3 and** $f(x) = \dfrac{1}{3x+2}$**, then f(g(3))=**

   A: 1/11 B: 1/17

   C: 3/5 D: 9/11

4. **Which statement is correct for the following functions?**

   $f(x) = \dfrac{2}{7}x^2, \qquad g(x) = -x^3$

   A: Both I and II are even. B: Both I and II are odd.

   C: I is even and II is odd. D: I is odd and II is even.

5. **If f(x) = x+3 and g(x) = x^2 , for what value of does f(g(x))=g(f(x))**

   A: 1 B: 0

   C: -1 D: 2

6. **Which of the following relations are said to be odd?**

   $y=x^2+1$, $y=\sin(x)$, $y=x^3-x+1$

   A: Only II. B: Only I & II.

   C: Only I & III. D: Only II & III.

7. ***Find the inverse of*** $g(x) = \dfrac{2x}{x-1}$

   A: $g^{-1}(y) = \dfrac{y+5}{y-2}$ B: $g^{-1}(y) = \dfrac{y}{y-2}$

   C: $g^{-1}(y) = \dfrac{y-7}{y}$ D: $g^{-1}(y) = \dfrac{y+4}{y-2}$

8. **If f(x) = x^2 + 3x - 4 and g(x)=x-4, then f(g(x))=**

   A: $2x^2$ - 3x + 2 B: $2x^2$ - 3x

   C: x^2 - 5x + 10 D: x^2 - 5x

9. **Find** $\lim\limits_{x\to 1} \dfrac{\sqrt{x}-1}{x-1}$

   A: ¼ B: 1/2

   C: 1 D: 2

10. Assuming that $\lim_{x\to a} f(x)$ and $\lim_{x\to a} g(x)$ exist, which of the following is correct:

- A: If $f(x) \geq 0$, then $\lim_{x\to a} f(x) \geq 0$
- B: If $f(x) \geq g(x)$, then $\lim_{x\to a} f(x) \geq \lim_{x\to a} g(x)$
- C: If $f(x) \geq 0$, then $\lim_{x\to a} \sqrt{f(x)} = \sqrt{\lim_{x\to a} f(x)}$
- D: All are correct.

11. If {(3,2),(4,2),(3,1),(7,1),(2,3)} is to be a function, which of the following must be removed from the set?

- A: (3,2)
- B: (4,2)
- C: (2,3)
- D: None of the above.

12. To show a function is discontinuous, we can do one of three things:

Show that the function fails the sequence definition, Show that the function fails the ε -> δ definition

Prove by contradiction by relating it to a function known to be discontinuous

- A: Only (i) is correct.
- B: Only (i) and (iii) are correct.
- C: None of these are correct.
- D: (i), (ii) and (iii) are correct.

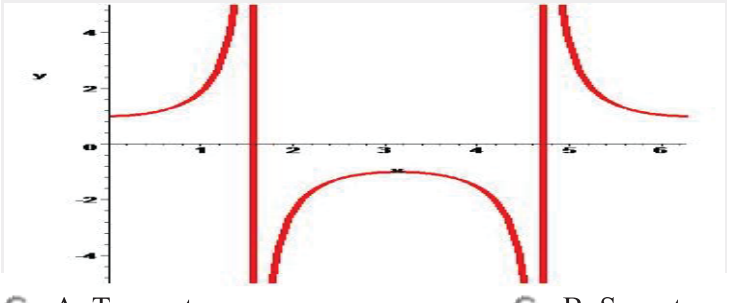
13. If f(x,y)=x+y and g(x,y)=x-y, then f(g(2,1),f(2,-1)) equals:

- A: 0
- B: 1
- C: 2
- D: 4

14. Range of the function f(x)= sin (x) is

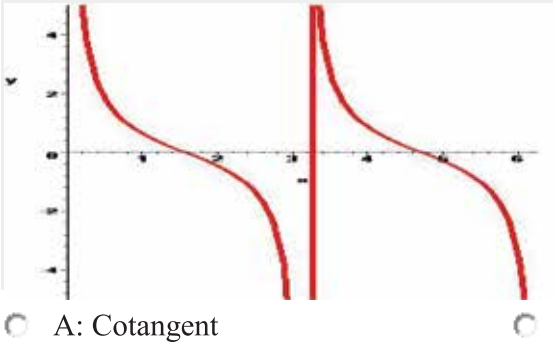
- A: [-1,1]
- B: $[-\frac{\pi}{2}, \frac{\pi}{2}]$
- C: [0,1]
- D: None of the above.

15. The following figure shows a graph of which type of function?



- A: Tangent
- B: Secant
- C: Cosecant
- D: Cosine

16. The following figure shows a graph of which type of function?



- A: Cotangent
- B: Arctangent
- C: Cosecant
- D: Tangent

17. f(x)=cos x, g(x)=sin x, h(x) = ±√x

- A: f(x) is the only function.
- B: g(x) is the only function.
- C: f(x) and g(x) are the only function.
- D: All three are functions.

18. Assuming that $\lim_{x\to a} f(x)$ and $\lim_{x\to a} g(x)$ exist, which of the following is not true:

- A: $\lim_{x\to a}(f(x) \pm g(x)) = \lim_{x\to a} f(x) \pm \lim_{x\to a} g(x)$
- B: $\lim_{x\to a}(f(x)g(x)) = (\lim_{x\to a} f(x))(\lim_{x\to a} g(x))$
- C: $\lim_{x\to a} \frac{f(x)}{g(x)} = \frac{\lim_{x\to a} f(x)}{\lim_{x\to a} g(x)}$
- D: $\lim_{x\to a} |f(x)| = -\left|\lim_{x\to a} f(x)\right|$

19. If $f(x,y) = 2x^2 - y^2$ and $g(x) = 2^x$, which of the following equal 2^{2x} ?

- A: f(x,g(x))
- B: f(g(x),x)
- C: f(g(x),g(x))
- D: f(g(x),0)

20. If $f(x) = 4x + 2$ for all x, then for x=0.5 $f^{-1}(x) =$?

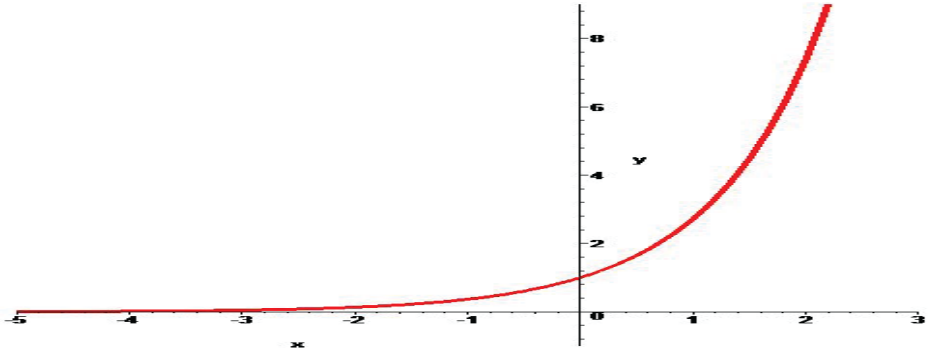
- A: 4
- B: $\frac{1}{16}$
- C: $\frac{1}{4}$
- D: $-\frac{3}{8}$

TEST 3

1. If g(x-1)= x^2 + 2, then g(x)=

- A: x^2 - 2x + 3
- B: x^2 + 2x + 3
- C: x^2 - 2x + 6
- D: x^2 - 2x

2. The following figure shows graph of which type of function?



- A: Log Function
- B: Exponential Growth
- C: Exponential Decay
- D: None of the above.

3. **If $f(x) = 3x - 5$ and $g(y) = y^2 - 1$, then f(g(z)) equals**

- A: $(3z - 5)^2 - 1$
- B: $3z^2 - 8$
- C: $3z^3 - 5z^2 - 3z + 8$
- D: $x^2 + 3z - 8$

4. $\lim_{x \to 0} \frac{\cos(2x) - 1}{\cos x - 1}$ **= ?**

- A: 2
- B: 4
- C: 8
- D: 10

5. $\lim_{h \to 0} \frac{\cos h - 1}{h} =$

- A: -1
- B: 0
- C: 1
- D: 2

6. $\lim_{x \to 0} \frac{x^4 + 5x - 3}{2 - \sqrt{x^2 + 4}}$ **= ?**

- A: 6
- B: 15
- C: ∞
- D: None of the above.

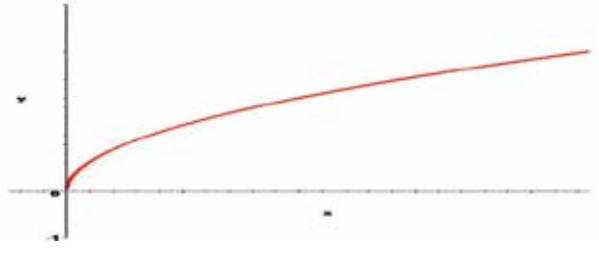
7. **If f(x) = x^2 - 4, for what real number values of x will f(f(x))=0?**

- A: $\sqrt{6}$
- B: $\pm\sqrt{6}$
- C: $\pm\sqrt{2} or \pm\sqrt{6}$
- D: No values

A straight line function, whose graph bisects the second and the fourth quadrants will have a value of ..... , when the value of 'x' is 'a'.

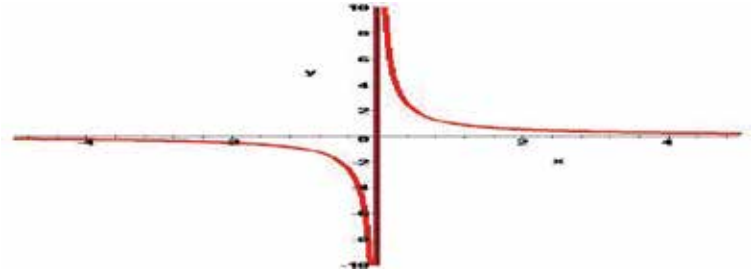
- A: a
- B: -a
- C: -2a
- D: 0

8. **The following figure may show a graph of which function?**



- A: $y = \sqrt{x}$
- B: $y = \sqrt[6]{x}$
- C: $y = \sqrt[5]{x}$
- D: Both A and B.

9. The figure shown below depicts a graph of which of the following functions?



- A: y=x+5
- B: $y = x^2 / (x+2)$
- C: $y = x^3 - 4$
- D: $y = 1 / x^3$

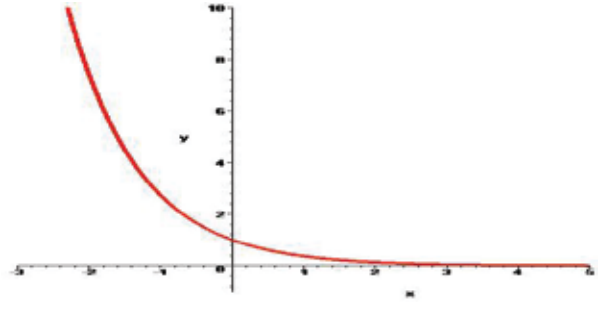
10. If $f(x) = 2^x$, then $f(\log_2 5)=$

- A: 2^5
- B: 2^2
- C: 2
- D: 5

11. If f is a linear function and f(1)=-2,f(-2)=1 and f(x)=1.5, what is x?

- A: 0.5
- B: -0.5
- C: -1.5
- D: -2.5

The wing figure shows a graph of which type of function?



- A: Log function
- B: Exponential Growth
- C: Exponential Decay
- D: None of the above.

12. If $f(x) = 3 - 2x + x^2$, then $\frac{f(x+t) - f(x)}{t}$ equals

- A: t-x+4
- B: t+2
- C: t+2x-2
- D: 2x-2

13. To show a function is continuous, we can do one of three things:

Show it satisfies the sequence definition of continuity, Show it satisfies the ε -> δ definition of continuity

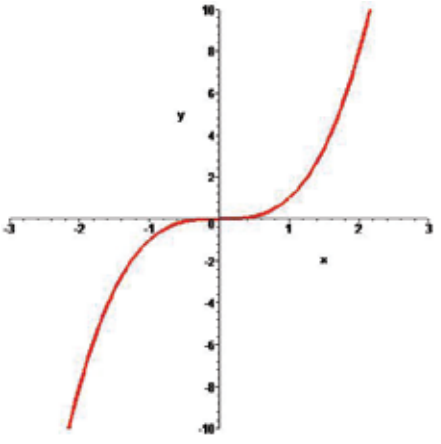
Decompose it into simpler functions we already know to be continuous

- A: Only (i) is correct.
- B: Only (i) and (iii) are correct.
- C: (i), (ii) and (iii) are correct.
- D: None of these are correct.

14. **If** $f(x) = \left\{ \begin{matrix} \frac{5}{x-2} & when & x \neq 2 \\ k & when & x = 2 \end{matrix} \right\}$, **what must the value 'k' equal in order that f(x) be a continuous** function?

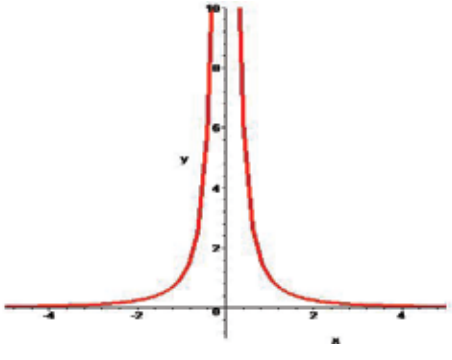
- A: 2
- B: 5
- C: 0
- D: No value of k will make f(x) a continuous function.

15. The following figure shows a graph of which type of function?



- A: Linear Function
- B: Even Degree Polynomial
- C: Odd Degree Polynomial
- D: None of the above.

16. The figure shown below depicts a graph of which of the following functions?



- A: $y = x^2 + 2x + 3$
- B: $y = 1 / x^2$
- C: $y = 1 / x^3$
- D: None of the above.

17. If $f(x) = \dfrac{3x-1}{2}$ **and f(g(x))=x, then g(x)=**

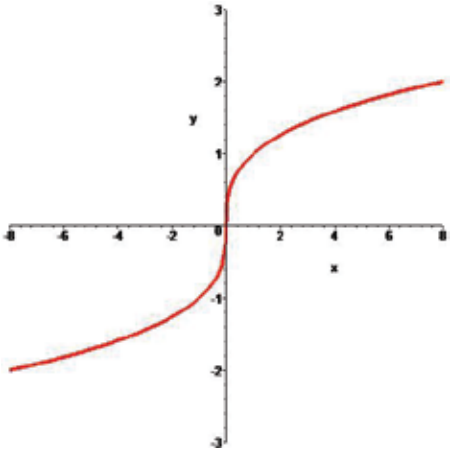
- A: $\dfrac{2x-1}{3}$
- B: $\dfrac{2x+1}{3}$
- C: $\dfrac{2x}{3} + 1$
- D: $\dfrac{2x}{3} - 2$

18. A straight line function, whose graph bisects the first and the third quadrants will have a value of ..... , when the value of 'x' is 'a'.

- A: 0
- B: 1
- C: a
- D: 2a

TEST 4

1. **The figure shown may depict a graph of which of the following functions?**



- A: $y = \sqrt[3]{x}$
- B: $y = \sqrt[4]{x}$
- C: Both A and B.
- D: None of the above.

2. **Find** $\lim_{x \to \infty} \dfrac{x^2 + 5x + 1}{2x^2 - 10}$

- A: 1/6
- B: 1/4
- C: ½
- D: 1

3. **Domain of the function f(x) = $5x^3 + 4x^2 + 2x - 5$ is:**

- A: (-∞ , +∞)
- B: (-4,4)
- C: (-5,5)
- D: None of the above.

4. **f={(x,y):y=4}, g={(x,y):**$x^2 - y^2$**=1}, and h={(x,y):x=3}, which of the these is a function?**

- A: f only
- B: g only
- C: h only
- D: f and h only

5. **If f(x) = x^2 + 1 and f(g(x))=4x-3, then g(x)=**

- A: $2\sqrt{x} - 1$
- B: $2\sqrt{x - 1}$
- C: $\sqrt{x - 1}$
- D: x-4

6. **If g(x)=3x+2 and g(f(x))=x, then f(2)=**

- A: 2
- B: 6
- C: 0
- D: 8

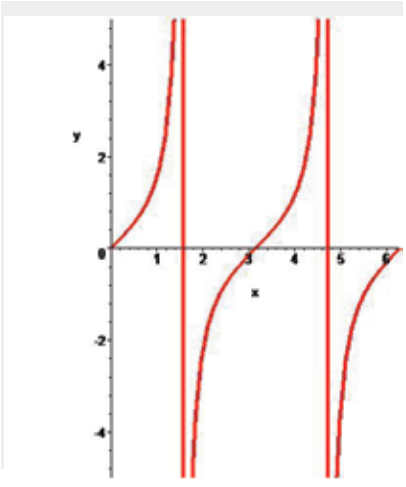
7. **If f(x,y)=2x-y and g(z)=sin z, then** $g(f(\pi, \dfrac{\pi}{2}))$ **equals:**

- A: 0
- B: -1
- C: 1
- D: 2

8. Which of the following is the inverse of the function $f(x) = \sqrt{x} - 1$, for all x>0?

- A: $(x+1)^2$
- B: $x^2 + 2$
- C: x+1
- D: x-2

9. The following figure shows a graph of which type of function?



- A: Sine
- B: Cosine
- C: Tangent
- D: Log

10. If $f(x) = x - \frac{1}{x}$, then $f(a) - f(\frac{1}{a})$ equals:

- A: 0
- B: 2a - 2/a
- C: a - 1/a
- D: 1

11. If f(x)=2x-3, the inverse of f(x) could be represented by:

- A: $f^{-1}(x) = 3x - 2$
- B: $f^{-1}(x) = \frac{1}{2x-3}$
- C: $f^{-1}(x) = \frac{x+2}{3}$
- D: $f^{-1}(x) = \frac{x+3}{2}$

12. What value(s) must be excluded for the domain of $\frac{f}{g}(x)$ if $f(x) = 3x^2 - 4x + 1$ and $g(x) = 3x^2 - 3$?

- A: 0
- B: 3
- C: 1
- D: both ±1

13. $\lim_{x=3} = \frac{5x^2 - 8x - 13}{x^2 - 5}$ = ?

- A: 0
- B: 5
- C: -2
- D: 2

14. If f(g(x)) = x^2 - 10 and g(x)=x+3 , then f(x)=

- A: x^2 + 6x + 8
- B: x^2 - 6x -1
- C: x^2 - 6x
- D: x^2 + 8

15. If f(x)=x, the inverse of f, f^{-1}, could be represented by:

- A: $f^{-1}(x) = x$
- B: $f^{-1}(x) = 1$
- C: $f^{-1}(x) = y$
- D: $f^{-1}(x) = \frac{1}{x}$

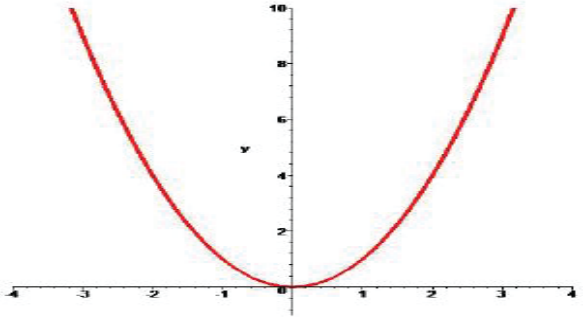
16. If $f(x) = x^3 - 4$, then the inverse of f=

- A: $-x^3 + 4$
- B: $\sqrt[3]{x+4}$
- C: $\sqrt{x-4}$
- D: $\frac{1}{x-4}$

17. Find $\lim_{x \to 4} \frac{x^2 - 6x + 8}{x - 4}$.

- A: -2
- B: 0
- C: 2
- D: 4

18. The following figure shows graph of which type of function?



- A: Linear function
- B: Even degree polynomial
- C: Inverse of even degree polynomial
- D: Inverse of odd degree polynomial

19. Find $\lim_{x \to \infty} \frac{3x^2 + 1}{4x^3 + 2x + 1}$

- A: 0
- B: 4
- C: 10
- D: 15

20. If $f(x) = ax^2 + bx + c$ and f(1) = 3 and f(-1) = 3, then a+c equals

- A: -3
- B: 0
- C: 3
- D: 6

Differentiation

TEST 1

1. $\lim_{x \to 0} \frac{1 - cos\, x}{x} = ?$

- A: 1
- B: 0
- C: -1
- D: Infinity

2. d/dx f(x).g(x) = ?

- A: f(x).g(x)
- B: f'(x).g(x) + f(x).g'(x)
- C: f'(x).g(x) - f(x).g'(x)
- D: f'(x).g'(x) + f(x).g(x)

3. d/dx Sin^{-1} x = ?

- A: $1/(1-x^2)^{1/2}$
- B: $- 1/(1-x^2)^{1/2}$
- C: $1/(1+x^2)^{1/2}$
- D: $-1/(1+x^2)^{1/2}$

4. What is the derivative of $(2x + 3)^5$?

- A: $10(2x + 3)^4$
- B: $10(2x + 3)^6$
- C: $5(2x + 3)^4$
- D: $5(2x + 3)^6$

5. dy/dx of f(x) = log(log (x)) is ?

(Please assume log as "Log to the base e" or Ln)

- A: 1 / log x
- B: x / log x
- C: 1 / (x log x)
- D: 2 / log x

6. $\frac{d}{dx} log(sin\, x) = ?$

- A: tan x
- B: cot x
- C: 1 / sin x
- D: 1 / cos x

7. If $y=e^x$, then the rate of change of y with respect to x at point (0,1) is?

- A: e
- B: 1
- C: -1
- D: 2

8. Under which of the following condition the given expression is true?

$$\frac{f(x_1) - f(x)}{x_1 - x} = f'(x)$$

- A: As x approaches the value of x_1.
- B: As x_1 approaches the value of x.
- C: As x approaches the value of 0.
- D: Both A and B.

9. $\lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = ?$

- A: f'(x)
- B: ∫ f(x)dx
- C: ∫ f'(x)dx
- D: None of the above.

10. If $y = 1/ x^2$ then dy/dx at x = -2 is ?

- A: ¼
- B: 1
- C: ½
- D: -1/2

11. d/dx sin x at x = π/2 is?

- A: 1
- B: -1
- C: √2/2
- D: 0

12. d/dx ($\cos^2 x + \sin^2 x$) = ?

- A: 2 sin x + 2 cos x
- B: 0
- C: 2 sin x cos x
- D: 1

13. Which of the following statement is false?

- A: d/dx c = 0 ; where c is a constant.
- B: d/dx [c f(x)] = c d/dx f(x)
- C: d/dx [f(x) * g(x)] = d/dx f(x) * d/dx g(x)
- D: d/dx [f(x) + g(x)] = d/dx f(x) + d/dx g(x)

14. Who is/or thought to be the inventor of differential calculus and fundamental theorums of calculus?

- A: Albert Einstien.
- B: Isaac Newton.
- C: Gottfried Leibniz
- D: Both B and C.

15. Derivative of ln e^{4x} w.r.t x is?

- A: 4
- B: 4x
- C: $1/e^{4x}$
- D: e^{4x}

16. The slope of a curve at point P = 7. If dx = 0.01 and it is very close to P then dy =?

- A: 0
- B: 0.7
- C: 0.07
- D: 0.49

17. The equation of a line is y = 9/4 x - 33. What is the property of dy/dx?

- A: It is increasing.
- B: It is decreasing.
- C: It is a constant value.
- D: It is first increasing and then decreasing.

18. $\frac{d}{dx}x^n = ?$

- A: nx
- B: nx^n
- C: nx^{n-1}
- D: $1/n+1\ x^{n+1}$

19. What is the derivative of $1/ (ax + b)^n$?

- A: $-n (ax + b)^{-n-1}$
- B: $- an (ax + b)^{n-1}$
- C: $-an (ax + b)^{-n-1}$
- D: $-n (ax + b)^{n-1}$

20. $\lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = ?$

- A: f' (x)
- B: dy / dx
- C: $\int f'(x)dx$
- D: All of the above.

TEST 2

1. **If the tangent to the graph of f(x) at the point "a" makes an angle of 45^o with the x-axis, then what is the value of f'(x)?**

   - A: 0
   - B: 1
   - C: 2
   - D: Not enough information.

2. **The function f(x) = cot (x) sin (x) has how many stationary points in the interval [0 , 2π]?**

   - A: 0
   - B: 1
   - C: 2
   - D: 3

3. **Which of the following is the correct expansion of sin x as Maclaurin series?**

   - A: $1 - x + x^2 - x^3$ ....
   - B: $x - x^3/3! + x^5/5! - x^7/7!$ .....
   - C: 1 + x/1! - 2x/2! + 3x/3! .....
   - D: 1 + 0.1x + 0.01x + 0.001x ....

4. **Which of the following is not true?**

   - A: $a = d^2s/dt^2$
   - B: a = dv/dt
   - C: $v = \int a\, dt$
   - D: $v = \int s\, dt$

5. $\frac{d}{dx}(\frac{a+x}{a-x}) = ?$

   - A: 0
   - B: $2(a+x) / (a-x)^2$
   - C: $2a / (a-x)^2$
   - D: $a / (a-x)^2$

6. **What are the two positive integers, whose sum is hundred and product is maximum?**

   - A: 30, 70
   - B: 45, 55
   - C: 43, 57
   - D: 50, 50

7. **Value of e is equal to which of the following infinite series?**

   - A: 1 + 1/1! + 1/2! + 1/3! ...
   - B: 1 + 0.1 + 0.01 + 0.001 ...
   - C: $1 - 1^3/3! + 1^5/5! - 1^7/7!$ ....
   - D: 1! - 2! + 3! - 4! ...

8. **What is the derivative of $(1 + \tan^2\theta)$ w.r.t tan θ?**

   - A: 2 sec θ
   - B: 2 tan θ
   - C: $\sec^2 \theta$
   - D: $2 \tan\theta \sec^2\theta$

9. **Which of the following is not true for function $f(x) = |4 - x^2|$?**

   - A: Function value is always positive.
   - B: Function is continuous.
   - C: Function is differentiable at x = +2 and -2.
   - D: Its domain is the set of all real numbers.

10. $\frac{d}{dx}e^{e^x} = ?$

    - A: $e^x e^{e^x}$
    - B: e^{e^x}
    - C: e^{2x}
    - D: $1/e^x$

11. $\frac{d}{dx} tan^{-1} \sqrt{\frac{1-cos\,x}{1+cos\,x}} = ?$

- A: 1
- B: 2
- C: ½
- D: -1/2

12. Maximum value of (ln x) / x is ?

- A: 0
- B: 1
- C: e
- D: 1/e

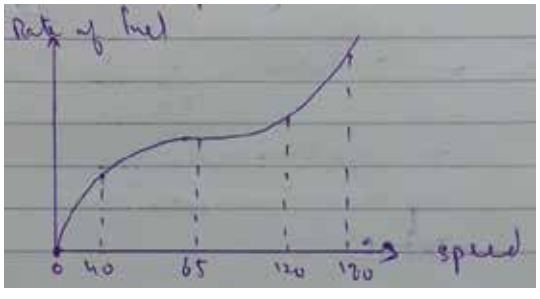
The maximum area of a rectangle of perimeter 176 cm is?

- A: 1854 cm^2
- B: 1936 cm^2
- C: 2110 cm^2
- D: 3246 cm^2

13. What is the derivative of $(x^3+1)^9$?

- A: $9(x^3+1)^8$
- B: $10(x^3+1)^{10}$
- C: $9x^2\,(x^3+1)^8$
- D: $27x^2\,(x^3+1)^8$

14. The graph below shows the rate of fuel consumption with respect to the speed of the car. What is the most efficient speed with repect to the fuel consumption?



- A: 40
- B: 65
- C: 120
- D: 180

15. Critical point on the graph is the point for which?

- A: f'(x) = 0
- B: f'(x) does not exist
- C: f'(x) = 1
- D: Both A and B.

16. Derivative of an even function is always ?

- A: An odd function
- B: An even function
- C: Negative function
- D: Could be even or odd

17. If distance s of an object is given by the function $s=100t - 25t^2$, then what is the velocity at t= 1/2?

- A: 25
- B: 50
- C: 75
- D: 100

18. $x^2 + y^2 = 4$ is the equation of a circle. What is the slope at a point where x = 0?

- A: 0
- B: 2
- C: 4
- D: 1/2

19. If y = f(f(x)) ; f(0) = 0 and f'(0) = 1, then y'(0) is equal to ?

- A: 0
- B: 1
- C: 2
- D: 1/2

TEST 3

1. If $y = \left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \text{___} \infty\right)$, then $\frac{dy}{dx}$ =

   - A: 0
   - B: 1
   - C: x
   - D: y

2. **The function $x^3 + x^2 - 5x - 5$ is increasing at which interval?**

   - A: (-infinity , - 5/3]
   - B: [1 , infinity)
   - C: [-5/3 , 1]
   - D: Both A and B.

3. **d/dx cos(cos(cos x))) = ?**

   - A: -sin [cos (cos x)].sin x cos x
   - B: - cos [sin (sin x)] sin x sin x
   - C: -sin [cos (cos x)] sin (cos x) sin x
   - D: sin [cos (cos x)] cos (cos x)

4. $\frac{d}{dx}[\cos^{-1}(4x^3 - 3x)] = ?$

   - A: $\frac{3}{\sqrt{1 - x^2}}$
   - B: $\frac{-3}{\sqrt{1 - x^2}}$
   - C: $\frac{3}{\sqrt{1 + x^2}}$
   - D: $\frac{-3}{\sqrt{1 + x^2}}$

5. **y = |cos x| is not differentiable for x = ? (n in the given choices represent a set of integers)**

   - A: nπ/2
   - B: (2n+1) π/2
   - C: nπ
   - D: (n+1) π

6. **If $y = e^{2x + 3 \log x}$, then dy/dx is equal to?**

   - A: $x^2 e^{2x} (2x + 3)$
   - B: $x^2 e^{2x} (2x - 3)$
   - C: $x^3 e^{2x}$
   - D: $x^2 e^{2x} 2x$

7. **If x > 0 and xy = 1, then the minimum value of (x + y) is?**

   - A: -2
   - B: -1
   - C: 1
   - D: 2

8. **The point at which the curve $y = x^3 - 4x + 3$ has gradient 8 is?**

   - A: (2,3)
   - B: (4,5)
   - C: (1,0)
   - D: (0,1)

9. **If x = (cos θ + θ sinθ), y = (sinθ - θ cos θ), then dy/dx is equal to ?**

   - A: tan θ
   - B: cot θ
   - C: sin θ
   - D: cos θ

10. $\frac{d}{dx}\left(tan^{-1}\sqrt{\frac{1 + cos\, x}{1 - cos\, x}}\right) = ?$

    - A: -1
    - B: 1
    - C: ½
    - D: -1/2

11. The graph f(x)=cot x has critical points at which of the following points in the interval [0,π]?

- A: 0 and π
- B: 0 and π/2
- C: π and π/2
- D: π/4 and π/2

12. The minimum value of (x^2 + 250/x) = ?

- A: 75
- B: 50
- C: 5
- D: The function has no minimum value.

13. tan x is ____ function in the interval [0,π/2]?

- A: Increasing
- B: Decreasing
- C: Constant
- D: Discontinuous

14. The function x^3 - 27x + 5 is increasing when?

- A: |x| > 3
- B: |x| < 3
- C: x < -3
- D: x > 3

15. If $y = \tan^{-1}(\sqrt{1+x^2} + x)$, then $\frac{dy}{dx} = ?$

- A: 1 / 2(1+x^2)
- B: -1 / 2(1+x^2)
- C: 1 / 2(1-x^2)
- D: 2 / (1-x^2)

16. The point on the curve y = √x at which the tangent makes an angle of 45° with x axis is?

- A: (1,1)
- B: (1/16,1/4)
- C: (4,2)
- D: (1/4, 1/2)

17. If y = 12x^9 + 13x^7 + 5x^5 +19 then which of the following is true?

- A: $d^5y/dx^5 = 0$
- B: $d^7y/dx^7 = 0$
- C: $d^9y/dx^9 = 0$
- D: $d^{10}y/dx^{10} = 0$

18. If x > 0, y > 0 and x + y = 18, then the maximum value of xy is?

- A: 77
- B: 81
- C: 85
- D: 144

19. If √x + √y = √a then dy/dx = ?

- A: $(y/x)^{1/2}$
- B: $(x/y)^{1/2}$
- C: $-(y/x)^{1/2}$
- D: $-(x/y)^{1/2}$

20. Derivative of $a^{\sqrt{x}}$ = ?

- A: $a^{\sqrt{x}}$ ln a
- B: $a^{\sqrt{x}}$
- C: $a^{\sqrt{x}}$ / ln a
- D: $a^{\sqrt{x}}$ ln a / 2√x

TEST 4

1. **What is $d^{19}y/dx^{19}$ if $y = e^{-x}$?**
   - A: e^{-x}
   - B: $-e^{-x}$
   - C: $19e^{-x}$
   - D: $-19e^{-x}$
2. **The position of an object is given by $x = 15t - 5t^3$ where x is the position. What is the acceleration of the object when it is momentarily at rest?**
   - A: 0
   - B: 1
   - C: 15
   - D: -30
3. **A rectangle has perimeter 100m. Its maximum area would be?**
   - A: 480 m^2
   - B: 625 m^2
   - C: 690 m^2
   - D: 765 m^2
4. **The maximum value of function f(x) = sin x cos x is?**
   - A: 1
   - B: 2
   - C: ½
   - D: 0
5. **If x = log t and $y = t^2 - 1$, then the value of d^2y/dx^2 at t = 1 is?**
   - A: 1
   - B: 2
   - C: 3
   - D: 4
6. **What is the second derivative of $(3t + 2)^{-2}$ with respect to t?**
   - A: $-6(3t + 2)^{-3}$
   - B: $6(3t + 2)^{-4}$
   - C: $54(3t + 2)^{-3}$
   - D: $54(3t + 2)^{-4}$
7. **What is the derivative of sin x w.r.t cos x?**
   - A: cos x
   - B: tan x
   - C: - cot x
   - D: - cos x sin x
8. **d/dx sin x^o = ? (x is in degrees)**
   - A: cos x^o
   - B: x cos x^o
   - C: (- π/180) cos x^o
   - D: (π/180) cos x^o
9. $\frac{d}{dx} e^{ln\ sin\ x^2} = ?$
   - A: 2x cos x^2
   - B: x cos x^2
   - C: cos x^2
   - D: 1/sinx * 2 $e^{sin\ x}$
10. **If d/dx $(3x^3 + x)$ = d/dx $(-3x^2 - 5)$ then x = ?**
    - A: 1 or 2
    - B: -1/3
    - C: 0 or -1/3
    - D: 0 or 1
11. **d(x^x) / dx = ?**
    - A: x^x (1 + log x)
    - B: 1 + log x
    - C: log x
    - D: x log x

12. If $y = 3x^2 - 12x + 8$ then the slope of tangent at point (3,-1) is?

- A: -18
- B: 6
- C: -19
- D: 8

13. The curve y = sin (x) with domain = set of all real numbers has how many stationary points?

- A: Infinite
- B: 0
- C: 1
- D: 2

14. The derivative of e^x sinx w.r.t. e^x is

- A: cos x + sin x
- B: cos x
- C: sin x
- D: $e^x(\sin x + \cos x)$

15. If $\sin x = \frac{t}{\sqrt{1+t^2}}$, then $\frac{dx}{dt}$ is equal to

- A: 1
- B: $1 / (1+t^2)$
- C: $1 / (1 - t)^{1/2}$
- D: $1 / (1 + t^2)^{1/2}$

16. Differentiating $\ln(x^2 + 2x)$ w.r.t x gives?

- A: $1 / (x^2+2x)$
- B: ln (2x + 2)
- C: (2x+2) / x
- D: $(2x+2) / (x^2+2x)$

17. If $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \ldots \text{to } \infty}}}$, then $\frac{dy}{dx}$ is equal to

- A: x / (2y - 1)
- B: x / (2y + 1)
- C: log x / (2y - 1)
- D: 1 / x(2y - 1)

18. If $y = \tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ and $\theta = \tan^{-1} x$, then $\frac{dy}{d\theta} = ?$

- A: 1
- B: 1/2
- C: -1/2
- D: x/2

19. What is the derivative of $(x^2 + 1)(x^3 + 7)$ w.r.t x is?

- A: $5x^3 + 15x + 14$
- B: $5x^4 + 3x^2 + 14x$
- C: $6x^3$
- D: $6x^3 + 7$

20. The graph of function $y = x^3$ has a _____ point at x = 0 ?

- A: Inflection
- B: Stationary
- C: Turning
- D: Both A & B.

Integration

TEST 1

1. $\int f(x)g'(x)\,dx = ?$

- A: $f(x)g(x) - \int g(x)f'(x)\,dx$
- B: $f(x)g(x) + \int g(x)f'(x)\,dx$
- C: $f(x)g(x) - \int g'(x)f(x)\,dx$
- D: $f(x)g(x) + \int g'(x)f(x)\,dx$

2. $\int \cot x\,dx = ?$

- A: $\ln|\cos x| + c$
- B: $\ln|\sec x| + c$
- C: $\ln|\sin x| + c$
- D: $\ln|\operatorname{cosec} x| + c$

3. $\int_0^{3\pi/2} cos(x)dx \ =?$

- A: 0
- B: 1
- C: 3
- D: -1

4. $\int \frac{\tan\sqrt{x}}{\sqrt{x}}\,dx =$

- A: $\ln|\cos\sqrt{x}|$
- B: $2\ln|\cos\sqrt{x}|$
- C: $\ln|\sec\sqrt{x}|$
- D: $2\ln|\sec\sqrt{x}|$

5. The solution of the differential equation dy/dx = 2xy is?

- A: $y = ce^{-x^2}$
- B: $y = ce^{x^2}$
- C: $y^2 = 2x^2 + c$
- D: None of the above.

6. $\int_0^{\pi} sin(x)dx \ =?$

- A: 0
- B: 1
- C: 2
- D: $\sqrt{2}$

7. $\int (3x^2 - 2x + 1)\,dx = ?$

- A: $x^3 - x^2 + 1 + c$
- B: $x^3 - x + 1 + c$
- C: $x^3 - x^2 + x + c$
- D: $x^3 + x^2 + x + c$

$\int \sec x \tan x\,dx = ?$

- A: $\tan x + c$
- B: $\cot x + c$
- C: $\operatorname{cosec} x + c$
- D: $\sec x + c$

8. $\int_{-2}^{3} x^2dx \ =?$

- A: 8/3
- B: 19/3
- C: 28/3
- D: 35/3

9. If $f(x) = x^2$ then find dy when x = 3 and dx = 0.01?

- A: 0.02
- B: 0.04
- C: 0.06
- D: 0.08

10. $\int tan^2 x\, dx = ?$

- A: 2 tan x sec^2 x + c
- B: tan x + x + c
- C: tan x - x + c
- D: None of the above.

11. $\int [f(x)]^{-1} f'(x)dx = ?$ (f(x) > 0)

- A: f(x) + c
- B: ln | ln f(x) | +c
- C: ln f(x) + c
- D: $[f(x)]^{n+1} / (n+1)$

12. $\int_1^2 (2x^5 - x + 3)dx = ?$

- A: 45/2
- B: 39/2
- C: 17/2
- D: None of the above.

13. $\int dx/(ax + b) = ?$

- A: ln|ax + b| + c
- B: 1/a ln|ax + b| + c
- C: 1/b ln|ax + b| + c
- D: 1/a ln|a| + c

14. Which of the following mathematical function gives the area under the curve?

- A: Differentiation
- B: Integration
- C: Vector product
- D: Both B and C.

15. $\int x\, sinx\, dx = ?$

- A: x sin x + cos x + c
- B: - x sin x + cos x + c
- C: x cos x + sin x + c
- D: - x cos x + sin x + c

16. $\int \frac{x}{(1+x^4)} dx =$

- A: $\tan^{-1} x^2 + c$
- B: 1/2 $\tan^{-1} x^2 + c$
- C: $\cot^{-1} x^2 + c$
- D: 1/2 $\cot^{-1} x^2 + c$

17. $\int (2x + 3)^{1/2} dx = ?$

- A: 1/3 $(2x + 3)^{3/2} + c$
- B: 1/2 $(2x + 3)^{3/2} + c$
- C: 1/3 $(2x + 3)^{1/2} + c$
- D: 2/3 $(2x + 3)^{3/2} + c$

18. $\int$ tan x sec^2x dx = ?

- A: $sec^2x / 2 + c$
- B: $tan^2x / 2 + c$
- C: tan^2x
- D: 1/2 $(\cos x)^2$

19. What is the solution of the equation?

(sin y) (cosec x) dy/dx = 1

- A: sin y = sin x + c
- B: sin y = - sin x + c
- C: cos y = cos x + c
- D: cos y = - cos x + c

TEST 2

1. $\int \frac{1-x^2}{1+x^2}dx$ **= ?**

- A: x + Tan^{-1} x + c
- B: x - Tan^{-1} x + c
- C: -x + 2Tan^{-1} x + c
- D: -x - 2Tan^{-1} x + c

2. $\int_1^4 \left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)dx = ?$

- A: 20/3
- B: 14/3
- C: 8/3
- D: 5/3

3. The family of curve y = Ax + A^3 is represented by the differential equation of degree?

- A: 1
- B: 2
- C: 3
- D: 4

4. $\int \frac{\cos x - \sin x}{\cos x + \sin x}dx = ?$

- A: - ln (cos x - sin x) + c
- B: - ln (cos x + sin x) + c
- C: ln (cos x - sin x) + c
- D: ln (cos x + sin x) + c

5. $\int \frac{\cos x}{\sqrt{1+\sin x}}dx = ?$

- A: - $(1+\sin x)^{1/2}$ + c
- B: 2$(1+\sin x)^{1/2}$ + c
- C: 0.5 $(1+\sin x)^{1/2}$ + c
- D: - 0.5 $(1+\sin x)^{1/2}$ + c

6. $\int a^{\lambda x + y}\,dx$ **=?**

- A: 1/(λ ln a) $a^{\lambda x + y}$ + c
- B: 1/(ln a) $a^{\lambda x + y}$ + c
- C: 1/(λ ln a) $a^{x + y}$ + c
- D: 1/(ln a) $a^{x + y}$ + c

7. The order of a differential equation whose solution is y = a cos x + b sin x, where a and b are arbitrary constants, is?

- A: 1
- B: 2
- C: 3
- D: Cannot be determined.

8. $\int x \ln x\,dx$ **= ?**

- A: 0.5 x^2 (ln x - 0.5) + c
- B: x^2 (ln x + 0.5) + c
- C: 1.5 x (ln x + 1) + c
- D: x^2 (ln x - x) + c

9. The order and the degree of the differential equation $d^2s/dt^2 + 4 = 0$ are?

- A: Order is 2 and degree is 2
- B: Order is 2 and degree is 3
- C: Order is 1 and degree is 2
- D: None of the above.

10. $\int \ln(\tan x)\sec^2 x\,dx$ **= ?**

- A: ln (tan x) + tan x + c
- B: tan x ln (tan x) - tan x + c
- C: ln (tan x) - sec x + c
- D: tan x ln (tan x) + tan x + c

11. $\int \frac{1-\tan^2 x}{1+\tan^2 x} dx =$

- A: sin 2x
- B: 1/2 sin 2x
- C: cos 2x
- D: 1/2 cos 2x

12. The solution of the differential equation $\frac{dy}{dx} + \frac{1+\cos 2y}{1-\cos 2x} = 0$ is

- A: tan y + cot x = c
- B: tan y . cot x = c
- C: tan y - cot x = c
- D: tan y = c . cot x

13. Which of the following is an ordinary differential equation?

- A: $2y + 8x = \frac{d(cosx)}{dx}$
- B: $\frac{d(y+x)}{dx} = x^2 + sin\, x$
- C: $\frac{d(cos\, x + tan\, x)}{dx} = x + 2y$
- D: All of the above.

14. $\int$ sec^{2}x cosec^{2}x dx = ?

- A: tan x cot x
- B: tan x + cot x
- C: tan x - cot x
- D: - tan x cot x

15. $\int$ tan^2 x dx = ?

- A: tan x + x + c
- B: tan x - x + c
- C: sec^2 x - x + c
- D: cosec^2 x + x + c

16. $\int \frac{1}{(1+x^2)Tan^{-1}x} dx = ?$

- A: 1/x ln |Tan^{-1} x| + c
- B: -1/x ln |Tan^{-1} x| + c
- C: - ln |Tan^{-1} x| + c
- D: ln |Tan^{-1} x| + c

17. The solution of the differential equation y dy/dx = x - 1, satisfying x = 1 and y = 1, is?

- A: y^2 = 2x^2 - x – 1
- B: y^2 = x^2 - 2x + 2
- C: y = x^2 - 2x + 3
- D: y^2 = 2x^2 - x - 3

18. $\int ln\, x\, dx = ?$

- A: x (1 – ln x) + C
- B: x (ln x - 1) + C
- C: (1 + x) ln x + C
- D: (1 - x) ln x + C

19. A particle moves in a straight line with a velocity given by dx/dt = x + 1 (x is the distance described). The time taken by a particle to traverse a distance of 99 meters is?

- A: log 10e
- B: 2 log$_e$ 10
- C: 2 log 10 e
- D: 0.05 log10 e

20. The number of arbitrary constants in the second order differential euqation is?

- A: 0
- B: 1
- C: 2
- D: Infinite

TEST 3

1. $\int \frac{cos2x - 1}{1 + cos2x} dx \ = ?$

- A: - tan x + x + c
- B: tan x + x + c
- C: x - sec x + c
- D: x + sec x + c

2. $\int e^{-ln\,x}\, dx \ = ?$

- A: $e^{-\ln x}$
- B: ln |x|
- C: $-e^{-\ln x}$
- D: $-x\, e^{-\ln x}$

3. $\int_0^1 \frac{dx}{(1 + x^2)^{3/2}} \ = ?$

- A: 1
- B: √2
- C: 1/√2
- D: 3/√2

4. The solution of the equation $(e^x + 1)y\, dy = (y + 1)e^x\, dx$ is ?

- A: $y = e^x(e^x + 1) + C$
- B: $(y + 1) = e^{2x} + C$
- C: $y = e^x / x + C$
- D: $C\,(1 + y)(1 + e^x) = e^y$

5. The differential equation of all circles of radius 'r' is of order?

- A: 1
- B: 2
- C: 3
- D: 4

6. What is the solution of the differential equation,

$(x\sqrt{1 + y^2})dx + (y\sqrt{1 + x^2})dy = 0$

- A: $(1+y^2)^{1/2} + (1 + x^2)^{1/2} = c$
- B: $\log (1 + y^2) + \log (1 + x^2) = 2c$
- C: $\sin^{-1} y + \sin^{-1} x = c$
- D: $\tan^{-1} y + \tan^{-1} x = c$

7. $\int \frac{e^{tan^{-1}x} dx}{1 + x^2}$ **= ?**

- A: $xe^{tan^{-1}x} + c$
- B: $(tan^{-1}x)e^{tan^{-1}x} + c$
- C: $tan^{-1}x + c$
- D: $e^{tan^{-1}x} + c$

8. $\int_0^{2\pi} cos^2\theta\, d\theta \ = ?$

- A: π
- B: 2π
- C: 3π/2
- D: 3

9. $\int_0^{\pi} \sqrt{1 + sin\, x}\, dx \ = ?$

- A: 2
- B: 4
- C: √2
- D: 2√2

10. $\int |x|\, dx = ?$

- A: $x^2 / 2$
- B: $- x^2 / 2$
- C: $x\,|x| / 2$
- D: 1

11. $\int \frac{\sec x \operatorname{cosec} x}{\log \tan x} dx =$

- A: log [log tan x] + C
- B: cot (log x) + C
- C: tan (log x) + C
- D: None of the above.

12. If $\int x^6 \sin(5x^7)dx = \frac{k}{5}\cos(5x^7),\ x \neq 0$, then

- A: k = -1/7
- B: k = 1/7
- C: k = -7
- D: k = 7

13. $\int \frac{dx}{e^x + e^{-x}} = ?$

- A: log $(e^x + 1)$ + C
- B: log $(e^x + e^{-x})$ + C
- C: $\tan^{-1} e^x + C$
- D: $\sin^{-1} e^x + C$

14. The value of $\int \frac{(x - x^3)^{1/3}}{x^4} dx$ is

- A: $(3/8)\,(1/x^2 - 1)^{4/3} + C$
- B: $- (3/8)\,[(1/x^2) - 1]^{4/3} + C$
- C: $(1/8)\,(1 - 1/x^2)^{4/3} + C$
- D: $- (1/8)\,(1 - 1/x^2)^{4/3} + C$

15. $\int \frac{\cos x}{\sin x \,.\, ln \sin x} dx = ?$

- A: - ln |ln sin x| dx
- B: - ln |ln cos x| dx
- C: ln |ln sin x| dx
- D: ln |ln cos x| dx

16. $\int_0^{2\pi} \sqrt{1 + sin(x/2)}\, dx = ?$

- A: 2
- B: 4
- C: 8
- D: 0

17. $\int sin^{-1} x\, dx = ?$

- A: $x \cos^{-1} x + (1 - x^2)^{1/2} + C$
- B: $x \sin^{-1} x + C$
- C: $x \sin^{-1} x + (1 - x^2)^{1/2} + C$
- D: $- \sin^{-1} x + (1 - x^2)^{1/2} + C$

18. $\int_0^{\pi/2} sin\, x\, e^{cos\, x} dx = ?$

- A: 1
- B: e - 1
- C: e
- D: -1

19. $\int \frac{xe^x}{(1+x)^2}dx \ =?$

- A: $(1 + 2x\ e^x) / (1 + x)$
- B: $(1 - 2x\ e^x) / (1 + x)$
- C: $- e^x / (1+x)$
- D: $e^x / (1+x)$

20. The equation of the curve through the point (1, 0) and whose slope is $\frac{y-1}{x^2 - x}$ is

- A: $(y - 1)(x + 1) + 2x = 0$
- B: $2x(y - 1) + x + 1 = 0$
- C: $x(y - 1)(x + 1) + 2 = 0$
- D: $y(y - 1)(x - 1) + 2 = 0$

TEST 4

1. $\int \sqrt{1 + cos(x/4)}\, dx \ =?$

- A: $8\sqrt{2} \sin (x/8) + C$
- B: $- 8\sqrt{2} \sin (x/8) + C$
- C: $8\sqrt{2} \cos (x/8) + C$
- D: $- 8\sqrt{2} \cos (x/8) + C$

2. $\int_0^{\pi/2} sin^2 x\, dx \ =?$

- A: π
- B: $\pi/2$
- C: $\pi/3$
- D: $\pi/4$

3. $\int_0^{\pi} \sqrt{1 - cos\, x}\, dx \ =?$

- A: 1
- B: $\sqrt{2}$
- C: $2\sqrt{2}$
- D: 2

4. $\int_0^{\pi/2} sin(x)sin(2x)dx \ =?$

- A: 1/3
- B: 2/3
- C: 1
- D: pi

5. Which of the following statement is false?

- A: The degree of the differential equation is the highest power of the highest order differential coefficient occurring in it.
- B: The order of the differential equation is the highest order derivative occurring in the equation.
- C: The order of a differential equation is unique.
- D: The order of a differential equation is any integer.

6. $\int$ cos $\sqrt{x}$ dx = ?

- A: $[\sqrt{}\ x \sin \sqrt{x} + \cos \sqrt{x}] + C$
- B: $2[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}] + C$
- C: $[\sqrt{}\ x \sin \sqrt{x} - \cos \sqrt{x}] + C$
- D: $2[\sqrt{x} \sin \sqrt{x} - \cos \sqrt{x}] + C$

7. The differential equation $x\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^4 + y = x^2$ is of

- A: Degree 4 and order 2
- B: Degree 4 and order 3
- C: Degree 3 and order 2
- D: Degree 2 and order 3

8. What is the solution of the differential equation?

x dy + y(x - 1)dx = 0

- A: $y = c\, xe^{x}$
- B: $y = c\, xe^{-x}$
- C: $y = c\, e^{-x}$
- D: $y = c\, xe^{x+1}$

9. $\int [f(x)]^n f'(x)\, dx = ?$

- A: ln f(x) + c
- B: - ln f(x) + c
- C: $[f(x)]^{n+1} / (n+1)$
- D: $[f(x)]^n / (n+1)$

10. $\int x^2 e^{x^3} \cos(e^{x^3})dx$ is equal to

- A: $\frac{1}{3}sin(e^{x^3}) + c$
- B: $sin(e^{x^3}) + c$
- C: $3sin(e^{x^3}) + c$
- D: $-sin(e^{x^3}) + c$

11. If dr/dt = - rt and r(0) = r_0, then which of the following is correct?

- A: $r = r_o e^{-t}$
- B: $r = r_o e^{-t/2}$
- C: $r = r_o e^{-t.t}$
- D: $r = r_o e^{-t.t/2}$

12. $\int \frac{e^{2x} + e^x}{e^x} dx = ?$

- A: $e^x + 1 + c$
- B: $2x\, e^x + c$
- C: $e^{2x} + 1 + c$
- D: $e^x + x + c$

13. δy for any function f(x) is given by?

- A: f(δx)
- B: f(x + δx)
- C: f(x + δx) + f(x)
- D: f(x + δx) - f(x)

14. $\int_0^{\pi/2} cos^2 x\, dx = ?$

- A: π
- B: π/2
- C: π/3
- D: π/4

15. The solution of the equation y dx + x dy = 0 is?

- A: xy = c
- B: x/y = c
- C: x + y = c
- D: x - y = c

Analytic Geometry

TEST 1

1. **Equation of a line parallel to x axis at a distance 'a' below the x axis is?**

   A: $x = a$ B: $x = -a$

   C: $y = -a$ D: $y = a$

2. **What is the equation of a line perpendicular to a line with slope = -6? The line has y intercept of 4/3.**

   A: $y = x + 8$ B: $y = -6x + 4/3$

   C: $6y = x + 8$ D: $y = x + 3/4$

3. **The angle bisectors of a triangle are?**

   A: Perpendicular B: Concurrent

   C: Non-concurrent D: Parallel

4. **The equation of family of lines perpendicular to line $3x + 4y + 7 = 0$, is?**

   A: $4x + 3y + k = 0$ B: $4x - 3y + k = 0$

   C: $3x - 4y + k = 0$ D: $3x + 4y + k = 0$

5. **If m_1 and m_2 are the slopes of the perpendicular lines. Which of the following is true?**

   A: $m_1 = m$ B: $m_1 = -m_2$

   C: $m_1m_2 - 1 = 0$ D: $m_1m_2 + 1 = 0$

6. **Angle between lines $2x^2 - 7xy + 3y^2 = 0$, is?**

   A: 45^o B: 60^o

   C: 90^o D: 30^o

7. **What is the distance between the points A (7,5) and B (2,-6) ?**

   A: $\sqrt{73}$ B: $\sqrt{146}$

   C: $\sqrt{183}$ D: $\sqrt{219}$

8. **Equation of x axis is?**

   A: $y = 0$ B: $x = 0$

   C: $x = y$ D: $y = 1$

9. **What is the y intercept of the line $x - \sqrt{3}y + 10 = 0$**

   A: $10/\sqrt{3}$ B: $-10/\sqrt{3}$

   C: 10 D: -10

10. **The mid point of line joining points A (3 ,1) and B(-2,-4) is?**

    A: (5/2 , 5/2) B: (3/2, 1/2)

    C: (-1, -2) D: (1/2 , -3/2)

11. **If inclination of a line is 45^o then the slope is?**

    A: 0 B: 1

    C: -1 D: Infinity.

12. The point (-4,-2) lies on a circle. What is the length of the radius of this circle if the center is located at (-8,-10)?

- A: $\sqrt{47}$
- B: $\sqrt{80}$
- C: $\sqrt{95}$
- D: $\sqrt{108}$

13. If two medians of a triangle ABC pass through point (1,-2) then the third median pass through?

- A: (0,0)
- B: (-2,1)
- C: (-1,-2)
- D: None of the above.

14. Which of the following statement is true about any triangle?

- A: Altitudes and right bisectors are concurrent.
- B: Altitudes and right bisectors are non-concurrent.
- C: Altitudes are concurrent and right bisectors are not concurrent.
- D: Altitudes are not concurrent and right bisectors are concurrent.

15. If m_1 and m_2 are the slopes of two lines then the tangent of angle between the lines is equal to?

- A: $(m_2 - m_1) / (1 - m_1m_2)$
- B: $(m_2 + m_1) / (1+m_1m_2)$
- C: $(m_2 + m_1) / (1 - m_1m_2)$
- D: $(m_2 - m_1) / (1+m_1m_2)$

16. In the straight equation x cos a + y sin a = P, P represents?

- A: Y intercept
- B: X intercept
- C: Mid point of the line.
- D: Length of perpendicular from the origin to the line

17. What is the point of intersection for 5x + 7y = 35 and 3x - 7y = 21?

- A: (5,7)
- B: (7,0)
- C: (3,-7)
- D: (4,3)

18. If points A(a,b) ; B(c,d) and C(e,f) are collinear. Then the area of the triangle ABC is?

- A: 0
- B: 1
- C: 2
- D: 3

19. The point p (x,y) such that x>0 and y <0 lies in?

- A: Quadrant I
- B: Quadrant II
- C: Quadrant III
- D: Quadrant IV

20. What is the slope of the line ax + by + c = 0?

- A: 0
- B: Infinite
- C: -c/b
- D: -a/b

TEST 2

1. What is the symmetric form of the equation 5x - 12y + 39 = 0?

- A: $\frac{x + 39/5}{12/13} = \frac{y}{5/13}$
- B: (-5/13)x + (12/13) y = 3
- C: (-5/39)x + (12/39) y = 1
- D: y = (5/12) x + (39/12)

2. The equation of line parallel to x-axis and bisecting the join of (1, 4) and (− 2, 6) is?

- A: y = 3
- B: y = 5
- C: y + 2 = 5
- D: x = 5

3. What is the equation of a line passing through the point (4,2) and parallel to the line connecting points (0,-1) and (7,-15)?

- A: y + 2x + 10 = 0
- B: y + 2x - 10 = 0
- C: 2y + 3x - 7 = 0
- D: 2y + 3x + 7 = 0

4. The two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are perpendicular if?

- A: $a_1b_2 - a_2b_1 = 0$
- B: $a_1a_2 - b_1b_2 = 0$
- C: $a_1b_2 + a_2b_1 = 0$
- D: $a_1a_2 + b_1b_2 = 0$

5. The three lines $a_1x + b_1y + c_1 = 0$; $a_2x + b_2y + c_2 = 0$ and $a_3x + b_3y + c_3 = 0$ are concurrent if and only if?

- A: $a_1 = a_2 = a_3$ and $b_1 = b_2 = b_3$ and $c_1 = c_2 = c_3$
- B: $a_1 + b_1 + c_1 = 0$
- C:
- D:

6. If P(1, 2), Q(4, 6), R(5, 7) and S(a, b) are the vertices of a parallelogram PQRS, then?

- A: a = 0, b = 4
- B: a = 3, b = 4
- C: a = 2, b = 3
- D: a = 3, b = 5

7. The equation of general form $ax^2 + 2hxy + by^2$ represents?

- A: A line
- B: A curve
- C: A pair of lines
- D: A pair of lines through the origin

8. Centroid of a triangle divides each median in the ratio?

- A: 1:1
- B: 1:2
- C: 2:1
- D: 1:3

9. Find the radius of a circle whose diameter has endpoints (-3, -2) and (7, 8)?

- A: $10\sqrt{2}$
- B: $2\sqrt{10}$
- C: $5\sqrt{2}$
- D: $2\sqrt{5}$

10. The angle between the pair of lines represented by the equation $2x^2 + 3xy - 5y^2 = 0$ is?

- A: None of the above.
- B: $\tan^{-1}$ (4/3)
- C: $\tan^{-1}$ (11/3)
- D: $\tan^{-1}$ (7/3)

11. Of $P_1(x_1,y_1)$ and $P_2=(x_2,y_2)$ are two points such that line joining P_1P_2 is parallel to x axis then?

- A: $x_1 = x_2$
- B: $y_1 = x_2$
- C: $x_1 = y_2$
- D: $y_1 = y_2$

12. The equation of a straight line that intersects x axis at point 2 and y axis at point -4 is?

- A: y - 2x + 4 = 0
- B: y - 2x - 4 = 0
- C: 2x - y + 4 = 0
- D: x - 2y + 4 = 0

13. For a pair of lines represented by general equation $ax^2 + 2hxy + by^2$, if $h^2 > ab$ then?

- A: Lines are real and distinct.
- B: Lines are real and coincident.
- C: Lines are imaginary.
- D: Lines do not pass through the origin.

14. What is the equation of the line intersecting 3x - 4y - 10 = 0 and x + 2y - 10 = 0 and having a zero slope?

- A: 2x + 3y - 18 = 0
- B: y = 2
- C: x = 9
- D: 2x + 3y + 18 = 0

15. Slope of a line is negative if the angle z it froms with the x axis is?

- A: z = 0
- B: z > 90
- C: 0 < z < 90
- D: 90 < z < 180

16. If three points A(a,b), B(c,d) and C(e,f) are collinear then?

- A: Slope of AB is not equal to the slope of BC
- B: $\begin{vmatrix} a & b & 1 \\ c & d & 1 \\ e & f & 1 \end{vmatrix} = 0$
- C: $\begin{vmatrix} a & b & 1 \\ c & d & 1 \\ e & f & 1 \end{vmatrix} = 1$
- D: None of the above.

17. The equation below shows which form of the straight line equation?

$$\frac{x - x_1}{cos\,\alpha} = \frac{y - y_1}{sin\,\alpha}$$

- A: Normal form
- B: Two point form
- C: Symmetric form
- D: Point slope form

18. What is the distance between two parallel lines 2x - 5y + 13 = 0 and 2x - 5y + 6 = 0?

- A: 3/28
- B: 9/32
- C: 7/√29
- D: 4/√63

19. What is the normal form of the straight line equation 5x - 12y + 39 = 0?

- A: This equation cannot be represented in the two point form.
- B: y = (5/12) x + 39/12
- C: (-5/39) x + (12/39) y = 1
- D: (-5/13) x + (12/13) y = 3

20. The points of line |x| = |y| may lie in which quadrant?

- A: Quadrant I
- B: Quadrant I & III
- C: Quadrant II and IV
- D: Quadrant I, II , III or IV

TEST 3

1. **Find the value of k in the equation (3x - 4y - 10) + k(x + 2y - 10) = 0 such that the line is perpendicular to a line with slope 3/4?**

   A: 4 B: 5

   C: 6 D: 7

2. **The pair of lines represented by the equation $2x^2 + 49xy - 2y^2$ are?**

   A: Imaginary. B: Parallel

   C: Perpendicular D: None of the above.

3. **The straight lines given below form what kind of triangle?**

   $x + y - 4 = 0$, $3x + y - 4 = 0$, $x + 3y - 4 = 0$

   A: Isoceles B: Equlateral

   C: Right angled D: None of the above.

4. **Pair of lines represented by the equation $2x^2 + 8xy + 8y^2$ are?**

   A: Real and distinct. B: Real and coincident.

   C: Imginary. D: None of the above.

5. **What is the value of h such that points (-1,h) , (3,2) and (7,3) are collinear?**

   A: 1 B: 2

   C: 3 D: 4

6. **The lines px + qy + r = 0, qx + ry + p = 0, rx + py + q = 0 are concurrent if?**

   A: $p + q + r = 0$ B: $p^2 + q^2 + r^2 + pq + qr + rp = 0$

   C: $p^2 + q^2 + r^2 + 3pqr = 0$ D: All of the above.

7. **The equation of base of an equilateral triangle is x + y = 2 and the vertex opposite to this base is (2, − 1). Then the length of the side of triangle equals?**

   A: $\sqrt{3}$ B: $\sqrt{1} / \sqrt{3}$

   C: $\sqrt{2} / \sqrt{3}$ D: $\sqrt{3} / \sqrt{2}$

8. **For a pair of Imaginary lines represented by the equation $ax^2 + 2hxy + by^2$. Which of the following is true?**

   A: The imaginary lines never intersect.

   B: They intersect at (0,0) C: They intersect at postivie y axis.

   D: They intersect at negative y axis.

9. **If vertices of triangle ABC are A(2,2), B(-4,-4) and C(5,-8). Then the length of median through C is?**

   A: $\sqrt{65}$ B: $\sqrt{75}$

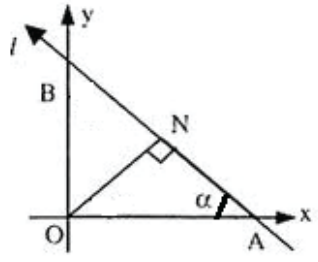
   C: $\sqrt{85}$ D: $\sqrt{95}$

10. **For a pair of lines represented by the equation $3x^2 + 4xy + 9y^2$, the lines are?**

    A: Real and distinct. B: Real and coincident.

    C: Imaginary. D: Not passing through the origin.

11. What the equation of a line at a distance 5 units from the origin, having angle $\alpha = 30^0$ as shown in the figure below?



- A: $\sqrt{3}x + y = 10$
- B: $x + \sqrt{3}y = 10$
- C: $\sqrt{3}x + y = 5$
- D: $x + \sqrt{3}y = 5$

12. Which of the following is true about the two points (0,0) and (-4,7) with respect to the line 2x - 3y + 6 = 0?

- A: They both lie on the line.
- B: They both lie above the line.
- C: They both lie below the line.
- D: They lie on the opposite sides of the line.

13. What is the radius of circle inscribed in the triangle formed by lines x = 0, y = 0 and 4x + 3y −24 = 0?

- A: 2
- B: $2\sqrt{2}$
- C: 3
- D: 4

14. Equation of the right bisector of the line segment joining points (7,4) and (-1,-2) is?

- A: 4x + 3y -10 = 0
- B: 4x + 3y - 15 = 0
- C: 3x - 4y + 7 = 0
- D: 3x - 4y - 7 = 0

15. The line segment joining the point (-3,-4) and (1,-2) is divided by the y axis in ratio?

- A: 1:1
- B: 2:1
- C: 3:1
- D: 4:1

16. If the coordinates of the mid point of the triangle are (1,-1), (2,3) and (3,2) then the area of triangle is?

- A: 3/2
- B: 9/2
- C: 6
- D: 11/2

17. The straight lines x + y = 0, 3x + y − 4 = 0 and x + 3y − 4 = 0 form which of the following triangles?

- A: Isoceles
- B: Equilateral
- C: Right Angled
- D: None of the above.

18. Points A(1, 3) and C(5, 1) are opposite vertices of a rectangle ABCD. If the slope of BD is 2, then its equation is

- A: 2x - y = 4
- B: 2x + y = 4
- C: 2x + y = 7
- D: 2x - y = -7

19. If the sum of the slopes of the lines given by $x^2 - 2cxy - 7y^2 = 0$ is four times their product then c has the value?

- A: -1
- B: 1
- C: -2
- D: 2

20. Equation of the line passing through the point (1,-2) and cutting off equal intercepts from the axis would be?

- A: $x + y = 1$
- B: $x + y + 1 = 0$
- C: $x - y = 1$
- D: $x - y + 1 = 0$

TEST 4

1. For a pair of lines represented by the equation $ax^2 + 2hxy + by^2$, which of the following is true if the lines are parallel?

- A: $h^2 = 0$
- B: $h^2 > ab$
- C: $h^2 < ab$
- D: $h^2 - ab = 0$

2. If point A (-1,2) is the center of a circle and point B (7,5) lies on the circle. The diameter of circle is?

- A: 9
- B: $\sqrt{45}$.
- C: $\sqrt{73}$.
- D: $2\sqrt{73}$

3. The coordinate axis is changed through the point O' (2,3). If coordinates of a point P in new axis are (-1,4) then the original coordinates of P were?

- A: (0,0)
- B: (2,3)
- C: (1,7)
- D: (3,-1)

4. The point P (x,y) with $x<0$ and $y<0$ lies in which quadrant?

- A: Quadrant I
- B: Quadrant II
- C: Quadrant III
- D: Quadrant IV

5. What are the new coordinates of the point P(5,3), if the axis is rotated by angle 45^o?

- A: (4,2)
- B: $(\sqrt{2}, 2\sqrt{2})$
- C: $(2\sqrt{2}, -\sqrt{2})$
- D: $(4\sqrt{2}, -\sqrt{2})$

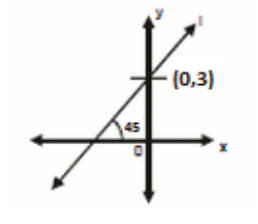
6. Inclination of the line y = -x is?

- A: 45^o
- B: 135^o
- C: 225^o
- D: 315^o

7. What is the angle between the lines L_1 joining points (1,-7) and (6,-4) and L_2 joining points (-1,2) and (-6,-1)?

- A: 0
- B: 30
- C: 45
- D: 60

8. The equation of the line given below is?



- A: $y = 3x - 1$
- B: $y = 3x + 1$
- C: $y + x = 3$
- D: $y = x + 3$

9. **Two sides of an isosceles triangle are given by the equation $7x - y + 3 = 0$ and $x + y - 3 = 0$. If its third side passes through the point (1, – 10), then its equations are**

- A: x - 3y - 31 = 0 or 3x + y + 7 = 0
- B: x - y - 31 = 0 or x + y + 7 = 0
- C: 2x - 3y - 11 = 0 or x + 4y + 9 = 0
- D: x + y + 1 = 0 or 5x - y + 10 = 0

10. Equation of the line through the point (2,3) and perpendicular to the line joining (-5,6) and (-6,5) is given by?

- A: x - y + 5 = 0
- B: x + y + 5 = 0
- C: x - y - 5 = 0
- D: x + y - 5 = 0

11. The extremities of diagonal of a parallelogram are the points (3, − 4) and (− 6, 5). If the third vertex is (− 2, 1), then the fourth vertex will be?

- A: (0,1)
- B: (1,0)
- C: (1,1)
- D: (-1,0)

12. Orthocenter of a triangle is defined as the point of intersection of?

- A: Altitudes
- B: Angle bisectors
- C: Medians
- D: None of the above.

13. If the lines represented by equation $Ax^2 + 2Hxy + By^2 = 0$ are perpendicular, then?

- A: A + H = 0
- B: A + B = 0
- C: H = 0
- D: A/B = H/B

14. What is the equation of the lines passing through the point (-5,-3) and (9,-1) ?

- A: x - 7y - 16 = 0
- B: x - 7y + 16 = 0
- C: x + 7y + 16 = 0
- D: x + 7y - 20 = 0

15. The diagonals of a parallelogram PQRS are along the lines x + 3y = 4 and 6x – 2y = 7. Then PQRS must be a?

- A: General parallelogram
- B: Rectangle
- C: Rhombus
- D: None of the above.

16. A line passes through point (4, 1) and is perpendicular to line 3x + y = 3, then its x − intercept is?

- A: ½
- B: 2/3
- C: 1
- D: 3/2

17. The line passing through point (1,2) and perpendicular to x + y + 1 = 0 is?

- A: y - x + 1 = 0
- B: y - x - 1 = 0
- C: y - x + 2 = 0
- D: y - x - 2 = 0

18. Distance between two lines defined by x + 3 = 0 and x - 3 = 0 is?

- A: 0
- B: 3
- C: 6
- D: 9

19. M is the midpoint of line AB. The coordinates of A are (-2,3) and the coordinates of M are (1,0). The coordinates of B are?

- A: (-1/2,3/2)
- B: (4,-3)
- C: (4,6)
- D: (-4,-3)

20. If a line passing through the points (x_1 , y_1) and (x_2 , y_2) such that $x_1 = x_2$ then the slope of the line is?

- A: Zero
- B: Positive
- C: Negative
- D: Undefined